**Does Career Mentoring Enhance College Readiness? Experimental and Social Validity Evidence from Detroit of Career Mentoring Impacts, Mechanisms, and Program Improvement**

by

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For Everett and Ellen

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**ABSTRACT**

This dissertation includes three manuscripts that evaluate career mentoring as an approach to enhancing Detroit students' college readiness. Recent trends reveal that most Detroit high school graduates are not prepared for college, and so, not surprisingly, even though about half of all graduates pursue higher education, college persistence is low and the vast majority of students never earn degrees. Low rates of postsecondary educational attainment demand a response, and educational and community organizations, thus, aim to support Detroit young people on their paths towards higher education. Career mentoring is one way that community members have tried to support Detroit's young people. Since 1994, the Winning Futures (WF) career mentoring organization has partnered with Metro Detroit schools to pair young people with professionals within their local communities. In partnership with WF, this dissertation investigated whether and how such an approach supports students. Specifically, I aimed to answer: How does career mentoring benefit students, with a particular focus on enhancing college readiness? What aspects of career mentoring seem particularly promising? And how might programs such as this one be improved to enhance the benefits for students?

The first manuscript presents results from an experimental evaluation of the WF career mentoring program. Results of a randomized control trial assessed WF's impact on students' academic performance and college-ready attitudes. Classrooms participating during the 2019-2020 schoolyear were randomly selected. Outcomes measured included: students' first semester grades, and self-reported self-efficacy, growth mindset, goal orientation, perseverance, and adult support. The results suggested that career mentoring enhances college readiness both attitudinally and academically, although many of the findings lacked statistical significance.

The second manuscript presents a subjective evaluation of WF. Using a social validity framework, I share the perspectives of WF participants on the social importance of the program's effects and the perceived mechanisms through which the program benefits students. I facilitated a total of fifteen focus groups and interviews with participating students, mentors, and classroom teachers. The results supported the quantitative findings that career mentoring enhances college readiness, particularly in its effects on non-cognitive and navigational factors. Additionally, the

findings highlighted several avenues through which career interventions operate. Importantly, I found that strong mentoring relationships provide an essential foundation upon which the impacts of career mentoring depend.

The third manuscript explored how career mentoring programs might enhance the benefits students receive by encouraging more frequent student-mentor virtual communication. I present the results of an experiment that tested a light-touch nudge intervention designed to encourage mentors to reach out more often via text message, email, or phone. Unexpectedly, the results showed that, although there were no differences in the overall frequency of mentors' outreach, the intervention resulted in lower ratings of student responsiveness (both self-reported and mentor-reported) and less-frequent student-initiated outreach. Additionally, mentors who were encouraged to reach out gave worse ratings of their relationships with students at the end of the program, and students of treated mentors gained less from the program in terms of their college-ready attitudes. Exploratory analyses examined possible causal mechanisms driving the intervention's negative impacts. Taken together, the study's findings point to the limitations of behavioral interventions to encourage relational practices and underscore the importance of carefully considering the content of nudges to ensure that reminders messages ultimately enhance student support.

## Chapter 1

## Introduction

Detroit students who obtain a college degree overcome many obstacles in order to do so. Higher education attainment in Detroit must first be viewed against the backdrop of concentrated urban poverty and racial segregation owing to a long history of deindustrialization and racist policies and structures that have reshaped the city since World War II (Boyle, 2001; Darden, Hill, Thomas, & Thomas, 1987). In recent years, the Great Recession only exacerbated these trends with the city filing for bankruptcy, state agencies taking over many Detroit public schools, and many Detroit residents experiencing unemployment and home foreclosures (Sugrue, 2014). Throughout the post war era, economic and population decline in Detroit have resulted in disinvestment in public institutions, including public schools. The consequences included chronic school budget deficits and perpetual political battles over educational reforms, significantly barring sustained efforts to adequately support or improve public education (Mirel, 1998).

Recent trends in educational attainment for Detroit graduates reveal the impact of the structural barriers students face. Even though about half of all high school graduates pursue higher education, most are not adequately prepared for success in college (Brockman, Chong, Camo-Biogradlija, & Jacob, 2021). Using college entrance exam performance as a measure of college preparation, only nine percent of Detroit graduates from the class of 2018 earned a "college-ready" score as defined by local institutions of higher education.[1] College persistence is low and the vast majority of students never earn degrees. Among the high school class of 2013, the most recent cohort with six years of postsecondary data available, only 35 percent of enrollees at 4-year institutions and a mere 10 percent of 2-year enrollees ever earned a degree.

Such low rates of postsecondary educational attainment for Detroit students demand a response, and it is impossible to view the obstacles students face without seeing the need for multi-faceted, systemic solutions. Educational and community organizations, thus, aim to provide supports for Detroit young people to aid them on their paths towards higher education. Career

[1] Several Metro Detroit colleges use an SAT score of 1060 as a rule-of-thumb for assessing college readiness and determining eligibility for scholarship opportunities.

mentoring is one way that community members have tried to build into Detroit's young people. Since 1994, the Winning Futures career mentoring organization has partnered with Metro Detroit high schools to pair young people with professionals within their local communities. In partnership with the Winning Futures organization, this dissertation investigates whether and how such an approach supports students. Specifically, I aimed to answer: How does career mentoring benefit students, with a particular focus on enhancing college readiness? What aspects of career mentoring seem particularly promising? And how might programs such as this one be improved to enhance the benefits of mentoring students receive?

My dissertation includes three empirical chapters. First, in Chapter 3, I present results from a randomized control trial evaluating the effects of the Winning Futures program on students' high school grades and self-reported college-ready attitudes. Second, in Chapter 4, I share results from a qualitative social validity evaluation of the Winning Futures program. In this paper, I present participants' perspectives on the benefits participating students receive, with a focus on college readiness. My findings also shed light on the key mechanisms through which Winning Futures benefits students, and on ways the program could improve to better serve students. Finally, in Chapter 5, I delve into one key mechanism – strong student-mentor relationships – to explore an approach to program improvement. This final chapter presents results from a randomized experiment evaluating a nudge intervention designed to enhance virtual communication between students and mentors. I turn next, in Chapter 2, to educational theory and empirical research that supports career mentoring as an approach to enhancing college readiness.

## Chapter 2

## Theoretical and Empirical Background, Research Context, and Contributions

### College preparation, access, and success in Detroit

Educational attainment in Detroit must be viewed in the context of a long of history economic and population decline due to deindustrialization and racist policies which have reshaped the city since World War II. Decentralization began when auto manufacturing firms moved out of the Detroit's city center, encouraging White homeowners and employers to abandon the city for the suburbs. Meanwhile, suburban leaders established exclusionary transportation and housing policies – such as those governing home loans (e.g., "redlining") – that effectively barred Black Detroiters from doing so. Black families that moved into previously all-White neighborhoods faced discrimination and violence: "windows shattered, car tires slashed, garages and even homes set ablaze" (Boyle, 2001, p. 144). The result, still seen today, was a highly racially segregated metropolitan area, with poor Black residents concentrated in the city center, and wealthier White residents in the surrounding suburbs (Darden et al., 1987).

As large portions of Detroit's population and commerce moved to the suburbs, its public schools faced a shrinking tax base which contributed to chronic budget deficits and under-funded schools (Mirel, 1998). In the mid-1990s, the district was on the brink of financial disaster. Since then, various educational reforms have each been met with resistance and political division, preventing sustained efforts to improve education (Mirel, 1998). In 2011, the state-run Education Achievement Authority (EAA) took over many of Detroit's public schools.

Detroit's declining economy and population led the city to disinvest in public institutions, including schools, trends which only accelerated in recent years. Detroit was hit hard by the Great Recession, which saw the city file for bankruptcy, and spikes in unemployment (peaking at 24.9% in 2009), poverty, and home foreclosures amongst Detroit residents (Sugrue, 2014). Detroit had one of the highest rates of subprime lending in the country: 68 percent of all city mortgages, compared with 27 percent statewide and 24 percent nationally (MacDonald & Kurth, 2015).

As a result of these historical processes and structures, Detroit has one of the highest rates of concentrated poverty in the U.S., with 38 percent of all residents living in poverty (U.S. Census

Bureau, 2018). Concentrated poverty makes it more difficult for people to be upwardly mobile, and Detroit is one of the least economically mobile cities for children, ranking 46th out of the 50 largest U.S. commuting zones (Raj Chetty, Hendren, Kline, & Saez, 2014). In other words, children who are born poor in Detroit are likely to remain poor throughout their lives.

Educational attainment offers a promising path out of poverty, yet rates of higher education among Detroit residents are low. Only 17 percent of young people 25-34 years old hold a bachelor's degree, half the national average of 35 percent (U.S. Census Bureau, 2017). Rates are particularly low among poor and racial minority students. For instance, among Black and Latino/a youth from Detroit only 12 percent and 4 percent, respectively, hold a bachelor's degree or higher—well below the national average of 21 percent and 16 percent (U.S. Census Bureau, 2017).

In recent years, about half of Detroit high school graduates enrolled in postsecondary education (Brockman et al., 2021). In the years since the Great Recession, enrollment at 4-year institutions has increased by 13 percent and more students are enrolling full-time, as opposed to part-time: 62 percent of students enrolled full-time in 2018, up from only 43 percent in 2010. Despite these optimistic trends, however, the vast majority of Detroit's graduating students are under-prepared for college: a mere nine percent of the 2018 graduating class earned a "college-ready" score of 1060 or higher on the SAT.[2] Moreover, most college enrollees – 97 percent of enrollees at 2-year institutions and 78 percent of 4-year enrollees – were under-prepared based on their college enrollment exam scores.

Unfortunately, many Detroit college enrollees fall off-track from graduation, and few eventually earn degrees (Brockman et al., 2021). Among students who enroll at 4-year institutions, less than two-thirds (59 percent) pass all of their first year coursework. Only one percent of 2-year enrollees had earned a degree by the end of their second year, a number that rises to only 10 percent after six years. The six-year degree attainment rate for students who enrolled at 4-year institutions was higher (35 percent), but still well below the state average (63 percent).

A recent survey showed that most Detroit high schools provide access to general, open-access college preparation resources (Brockman et al., 2021). As examples, most schools dedicate spaces and staff to providing information about college – 93 percent have a college center, and 83 percent have college counselors – and most offer college fairs (83 percent) and college information sessions (73 percent). More intensive college-readiness programs and coursework, however, were

[2] Several Metro Detroit colleges use an SAT score of 1060 as a rule-of-thumb for assessing college readiness and determining eligibility for scholarship opportunities.

less common. Only about half of all high schools (53 percent) reported participating in Federal TRIO programs (e.g., Upward Bound) or offering college readiness classes like a senior seminar or AVID (43 percent).

The perspectives of recent Detroit college students shed light on barriers to educational attainment. Students report that in addition to academic preparation, non-academic challenges such as financial difficulties pose equal or greater obstacles. Only 54 percent of college students reported that they have the financial resources necessary to succeed in college, compared to 86 percent who reported that they had the academic resources necessary (Brockman et al., 2021). Students who left college before earning their degree cited a lack of transportation, financial concerns, and family responsibilities as the main reasons they were no longer enrolled. Detroit students must overcome many obstacles, a difficult task even for those who begin college equipped with the knowledge and skills required for success. Without adequate preparation, the challenge is even greater. This underscores the importance of preparing students for college, building what researchers refer to as "college readiness" (Tierney & Duncheon, 2015).

**Defining college readiness**

As recent trends reveal, expanding higher education attainment in Detroit is not merely a matter of enrolling more students in college. High school students must also graduate with the skills and knowledge required to succeed in their coursework, as well as the personal competencies and social supports necessary to navigate postsecondary systems (Achieve Inc., 2014). This leads to a focus on what policymakers and researchers have termed "college readiness" (Duncheon, 2015). A "college-ready" student is prepared to enter postsecondary education without the need for remediation and to navigate the system to obtain a degree (Conley, 2012; Page & Scott-Clayton, 2016; Roderick, Nagaoka, & Coca, 2009). Prior research exploring the various competencies and knowledge this requires tends to identify three broad areas, depicted in Table 2.1 specifically: cognitive academic factors, non-cognitive factors, and navigational or transitional factors (Conley, 2007; Connect Ed California, 2012; Duncheon, 2015; McAlister & Mevs, 2012; Roderick et al., 2009).

Cognitive academic factors include the content knowledge and academic skills demanded by entry-level college coursework. Commonly used indicators of academic or cognitive preparation include: high school grade-point averages; test scores (e.g., SAT, ACT); subject-specific placement tests; and completion of key high school courses such as upper-level Algebra (M. C. Long, Iatarola, & Conger, 2009; Porter & Polikoff, 2012).

Preparation for college goes beyond academic knowledge and skills and includes attitudes, mindsets, and behaviors, a set of competencies sometimes referred to as "non-cognitive" factors (Farrington et al., 2012). Despite widespread recognition of their importance, there are no consistent measures of the non-cognitive aspects of college readiness, nor even agreement about which competencies matter most (Duncheon, 2015). Commonly referred-to capabilities relate to positive self-concepts (e.g., self-efficacy, self-esteem, growth mindset) and productive self-management or "student ownership of learning" (e.g., persistence, goal setting, time management) (Conley, 2012; Connect Ed California, 2012).

Navigational or transitional factors, a final aspect of college readiness, refers to the skills and knowledge students need to adapt to postsecondary settings (Conley, 2012). These competencies, which can also be framed as non-cognitive, help students to navigate complex admissions and financial aid processes and develop an understanding of college norms and cultures. This aspect of readiness, sometimes called "college knowledge," acknowledges the role of social capital in college access and success (Roderick et al., 2009).

Differences in levels of college-readiness have significant implications for students' postsecondary success. Recent evidence of the different success rates for college enrollees from Chicago with high versus low levels of preparation (as measured using academic indicators) demonstrates this fact. Roderick, Holsapple, Clark, and Kelley-Kemple (2018) reported the rates of college degree receipt among Chicago Public Schools (CPS) high school graduates from 2003-2009. They showed that CPS students help high aspirations: 76 percent of ninth-graders aspired to earn a bachelors' degree. Yet even the most qualified graduates – those with GPAs above 3.3 and ACT scores of 26 or higher – had just a 50 percent chance of earning a four-year degree within four years. The chances of success were much lower for many students. Only 10 percent of CPS graduates with a GPA of 2.5 or lower and ACT scores below18 earned four-year degrees. These low odds describe the chances for most CPS graduates; the average graduate earned a 2.2 GPA and an ACT score of 17.4.

These findings suggest at least two implications about the importance of college readiness. First, the stark differences in outcomes for students with greater and lower levels of preparation underscore the need for greater support. A high school diploma alone does not currently ensure success in college; more must be done to prepare lower-performing high schoolers for postsecondary success. Second, even among students who achieved relatively high levels of academic preparation in high school, degree attainment was low (just 50 percent). This likely points

to the need for enhanced support for current college students. Importantly, however, it may also indicate a gap in students' readiness in terms of non-academic factors, suggesting a need for enhanced support for non-cognitive and navigational college readiness.

**Career mentoring as a means of enhancing college readiness: Theory of action**

This dissertation examines career mentoring as an approach to enhancing Detroit students' college readiness, focusing on academic, non-cognitive, and navigational factors. Career mentoring takes a unique approach, combining supports from several types of youth programs. Like more general youth mentoring, career mentoring programs pairs youth with caring adult volunteers who act as advocates and role models (Rhodes, Spencer, Keller, Liang, & Noam, 2006). As in other career exploration interventions, career mentoring participants engage with activities designed to help them explore their career interests and plan their postsecondary pathways, for example, by engaging with online career exploration software (Hooley, Marriott, & Sampson, 2011). Past evidence on mentoring and career interventions demonstrate their potential to benefit youth in many ways, but the extent to which either approach enhances college readiness remains unclear.

Grounded in educational theories, it stands to reason that career mentoring would support students, and may specifically enhance their readiness for college. Specifically, Social Cognitive Career Theory demonstrates how this might occur. This framework illustrates how youth develop career and academic interests, and enact their career-related choices (Lent, Brown, & Hackett, 2002). The SCCT model highlights the importance of social learning experiences – such as observing role models, engaging in career exploration activities, and receiving support from a caring adult – through which youth develop career interests, set goals, and take steps towards their career objectives. It also shows how contextual influences, like career mentoring programs, can support students in setting and achieving career-directed short-term goals, and in so doing, enhance their readiness for college.

**Social Cognitive Career Theory**

Lent, Brown, and Hackett (1994) developed Social Cognitive Career Theory (SCCT) to depict how individual, contextual, and experiential factors contribute to the development of youths' interests, goals, and goal-directed behavior. The SCCT model draws its origins from Albert Bandura's general social cognitive theory (Bandura, 1986) which illustrates the connections between individuals' personal factors (cognitive and affective), the environments they inhabit (relationships and systems), and their ability to make choices and create meaning. Lent and colleagues (1994) adapted Bandura's more general model to emphasize aspects that are most relevant to the career

development process, noting that their framework is limited to issues of career entry and to the life periods (i.e., late adolescence and early adulthood) in which individuals prepare for and implement their career choices. The authors also noted their intention for the SCCT model to describe choices about both career and academic behaviors. Although for brevity they use the term "career," they point out that choices about post-high school education and career preparation are closely linked, and thus, the model is meant to encompass choices and behavior towards both outcomes (Lent et al., 1994, p. 80).

Three main concepts are central to SCCT: self-efficacy, outcome expectations, and goals. Self-efficacy refers to individuals' beliefs about their ability to organize and complete the steps necessary to achieve their desired level of performance (Bandura, 1986). According to social cognitive theory, self-efficacy is not static but rather a malleable set of self-beliefs that are specific to particular performance domains and linked to other individual, behavioral, and contextual factors. Outcome expectations refer to personal beliefs about probable outcomes in response to one's actions. Whereas self-efficacy beliefs concern an individual's capabilities (i.e., "I can do this"), outcome expectations concern the imagined consequences of performing particular behaviors (i.e., "If I do this, what will happen?"). Finally, goals can be defined as either the determination to engage in particular activities or to effect a given future outcome (Bandura, 1986). Goals play an important role in the self-regulation of behavior by helping individuals to organize and guide behavior and sustain it over long periods of time, even in the absence of reinforcement. In these ways, goals work to increase the likelihood of desired outcomes.

The SCCT model of career choice, displayed in Figure 2.1, operates as follows. Self-efficacy and outcome expectations work together to give rise to an individual's interests. These, in turn, promote the selection of career choice goals (i.e., plans, intentions, or aspirations to engage in a particular career pathway). Goals, then, lead to choice actions, also called "entry behaviors" (e.g., completing career-focused coursework, enrolling in college). These actions lead to achievement experiences (e.g., passing a placement test, failing a required course), which may support or weaken self-efficacy and outcome expectations, and ultimately choice persistence.

In addition to the cognitive and behavioral aspects of SCCT described thus far, personal and contextual factors also play a role. These include person inputs – that is, an individual's dispositions and identities such as gender and race – and contextual or background features – the social, physical, and cultural aspects of the individual's environment. These factors operate in the model at three points: as precursors to the socio-cognitive components (self-efficacy, outcome expectations, and

interests); moderators of proposed linkages within the SCCT model; and direct facilitators or deterrents (e.g., opportunities to participate in career mentoring).

The SCCT model encompasses both how individuals form career interests and educational goals (left side of the diagram in Figure 2.1) and their behaviors in pursuit of goals (to the right). At the heart of the SCCT model, social learning experiences link these two processes. Learning experiences are the context in which individuals generate meaning about the givens of their situations and start to form beliefs and expectations about the feasibility of a particular task. The SCCT model acknowledges that learning experiences are social in that personal and contextual factors impact the opportunities available to individuals as well as their experiences within them. For instance, a female high schooler may observe the steps of her career mentor (a female engineer), and decide to invest in future education to achieve her own STEM-career goals. Alternatively or in the absence of a mentor, she might internalize the message that women do not pursue STEM-related jobs, which would be a negative learning experience as a result of lack of role models or discriminatory statements.

Framed within the SCCT model, career mentoring seems a promising strategy for enhancing college readiness through multiple avenues. First, career mentoring can facilitate the formation of career interests and goals. As the SCCT model illustrates, interests and goals are not generated by a learning experience alone, but must be filtered through individuals' self-beliefs (efficacy, outcome expectations). This might occur during career mentoring as students observe their mentors as role models, experience mentors' support and encouragement, research different career pathways, and identify the requisite education and training to achieve their post-high school objectives. College-educated mentors can act as guides to help students navigate postsecondary and early career pathways, thus increasing students' sense of self-efficacy in these domains. As a result of these learning experiences, students may form or deepen their commitment to their career choice goals and subsequently, take steps (i.e., choice actions) to achieve them. Short-term steps might include increased focus on high school coursework, while longer-term steps might include enrolling in college or declaring a particular major.

Second, career mentoring programs can be viewed as contextual influences. According to SCCT, contextual influences contribute to choice goals and choice actions, and may also moderate the proposed linkages between career interests, goals, and actions. For example, mentored students may set choice goals that more closely align with their intended career pathways, like determining to complete an art course in pursuit of a career in a creative field. With a mentor's support, students

may be more able to persist towards or perform well in their short-term goals. For instance, mentors' encouragement and accountability can help students maintain passing grades in high school coursework, a prerequisite for college. As the model also shows, improved performance can itself be a learning experience that builds self-efficacy and outcome expectations, further enhancing students' commitment to their career interests and goals.

## Career mentoring as a means of enhancing college readiness: Evidence from youth programs

As the last section demonstrates, educational theory grounds career mentoring as an approach to enhancing college readiness. This section explores the empirical evidence from youth programs which also supports this approach. Although no studies, to my knowledge, explore the unique combination of supports employed by career mentoring programs – career exploration and advising in concert with supportive mentoring – past studies evaluate similar programs and approaches. A sizable literature describes the impact of programs designed to improve the educational and career outcomes of youth. The section below reviews the evidence on the following types of youth programs: mentoring, college preparation, and career exploration.

### Mentoring

Youth mentoring programs pair young people with caring adults who provide guidance and support, and can act as advocates and role models. Theoretical models show how close and trusting relationships with mentors shape youth's social-emotional, cognitive, and identity development (Rhodes, Grossman, & Resch, 2000; Rhodes et al., 2006). Empirical studies find that mentoring has positive, if only modest, impacts on a range of affective, behavioral, and academic outcomes (DuBois, Holloway, Valentine, & Cooper, 2002; DuBois, Portillo, Rhodes, Silverthorn, & Valentine, 2011; Raposa et al., 2019).

One of the largest and most well-known studies of mentoring evaluated the Big Brothers Big Sisters (BBBS) program, one of the most prominent and largest providers of mentoring to U.S. youth (Herrera et al., 2007; Herrera, Grossman, Kauh, & McMaken, 2011). The randomized control trial with over 1,100 study participants concluded that mentored youth performed better academically as measured by teachers' reports (effect size of 0.09) and self-reported more positive perceptions of their academic abilities (effect size of 0.11) after one year of mentoring as compared to a randomly selected control group. Mentored youth were also much more likely to report having a connection to a "special adult" (effect size of 0.18), an effect which persisted to the end of a

second schoolyear. This study also found suggestive evidence of a decrease in unexcused absences and serious school infractions for mentored youth.

Much of the evidence on mentoring comes from quasi-experimental and experimental evaluations of small programs, most with fewer than 200 participants (see, e.g., Komosa-Hawkins, 2012; Patel, Rodríguez, & Gonzales, 2015). Mentoring evaluations have assessed impacts on a wide range of outcomes such as: emotional and psychological well-being, problem or high-risk behavior, social competence, academic performance, and career and employment outcomes. As meta-analyses of mentoring studies show, however, the measured effects tend to be somewhat modest: several meta-analyses report an overall estimated effect size around 0.2 (DuBois et al., 2002; DuBois et al., 2011; Raposa et al., 2019). Of particular relevance to the potential for mentoring to enhance college readiness, S. Wood and Mayo-Wilson (2012) conducted the first-ever meta-analysis of school-based mentoring programs. They found very small, mostly non-statistically significant impacts on academic performance, attendance, attitudes, behavior, and self-esteem. In this study, the largest reported effect (for self-esteem) was close to zero (ES=0.09).

Only a few studies have looked directly at the impact of mentoring on college readiness. Rodríguez-Planas (2012) reported experimental results of the Quantum Opportunity Program (QOP) which offered low-performing high school students four years of mentoring, along with educational services and financial incentives. The program was found to increase the rate at which students graduated high school and enrolled in college. Woods and Preciado (2016) studied mentoring in the context of a high school SAT prep program of students from economic and racial backgrounds underrepresented in higher education. This study concluded that the strength of the relationships students and mentors formed influenced the students' beliefs and expectations about college. Specifically, the authors found that, controlling for students' SAT score growth, students who rated their mentoring relationship more favorably (i.e., viewed their mentor as a role model and believed their mentor was invested in their success) also experienced greater growth in their motivation, self-efficacy, and social norms around college. Finally, in postsecondary settings, mentoring has been shown to reduce "summer melt" in enrollment (Castleman & Page, 2015), and increase college graduation rates, with dramatic effects found for some programs (Bettinger & Baker, 2014; Scrivener et al., 2015).

The fact that many mentoring studies only have access to small samples and can often only employ quasi-experimental designs (e.g., non-randomly selected control groups) limits the extent to which they can support causal claims about the effects of mentoring. The consistently positive

findings across many studies over many years do suggest, however, that mentors likely benefit youth across multiple domains. In terms of its potential to enhance college readiness, mentoring appears to hold more promise for its effect on students' attitudes and social-emotional competencies than on their academic performance or study skills. Navigational aspects of college readiness may also be enhanced through mentors' influence as role models and advisors.

**College preparation programs**

College preparation, or "outreach," programs are another approach to supporting college readiness. Designed to supplement traditional school-based college counseling, these programs typically offer some combination of test prep, tutoring, financial aid information, college application assistance and guidance (Swail, 2000). Some programs – like the Quantum Opportunity Project, Upward Bound, and Advancement Via Individual Determination (AVID) – include mentoring components (B. T. Long, 2010).

Large-scale evaluations of college outreach programs do not demonstrate overwhelmingly positive results (Domina, 2009; Haskins & Rouse, 2013). For example, Myers, Olsen, Seftor, Young, and Tuttle (2004) conducted an experimental evaluation of the Upward Bound program which offers a combination of year-round college advising and information, academic counseling, tutoring services, and full-day summer programs often located on college campuses to students from low-income backgrounds. The authors found that although participating students earned slightly more high school credits, on average the program had no measurable effects on students' grades, course-taking patterns, high school graduation, or post-secondary enrollment. Upward Bound did, however, appear to have positive effects for a subsample of participants who began the program with low educational expectations. Among students who did not expect to earn a bachelors' degree, students who participated in Upward Bound took more advanced courses in high school and were five percentage points more likely to enroll in college than nonparticipants. This finding is supported by another study using ELS-2002 data in which college outreach participants were matched to a nonparticipating comparison group (Domina, 2009). Although the study concluded that outreach programs had no average effect overall, outcomes for students with initially low educational aspirations suggested that, for these students, outreach programs may hold promise. For example, outreach participants who reported that they did not expect to earn a bachelors' degree were nearly twice as likely to take advanced courses and were nearly five percentage points more likely to enroll in college as their peers in the matched comparison group.

Taken together, the evidence on college preparation programs shows that participating students receive a wide range of supports, but that the impacts – in terms of academic indicators of readiness and postsecondary outcomes – are modest. Much like mentoring programs, college preparation programs are grounded in educational theories, even if empirical evidence does not provide overwhelming support.

**Career interventions**

The Carl D. Perkins Vocational and Technical Education Act has provided federal support for secondary and postsecondary career and technical education programs in the U.S. since 1984. A wide variety of such interventions now exist. Career development interventions range from short, introductory experiences – like career fairs and assessments – to curriculum-based interventions such as career and technical education courses and career academies; from light-touch advising – including the use of computer-based exploration software – to more intensive, sometimes work-based experiences such as job shadowing and youth apprenticeships (Dykeman et al., 2001; Perry & Wallace, 2012). These programs aim to improve a variety of student outcomes ranging from school engagement and high school graduation, to career preparation and postsecondary enrollment. Most career initiatives to date lack a substantial research base demonstrating their effects. One exception is curriculum-based interventions, most notably CTE coursework and career academies, for which there is a growing body of research.

**Career and technical education.** Career and technical education (CTE) refers to course sequences, taught as part of secondary students' school day, which prepare participants to work in specific occupations. Many students take CTE courses alongside their academic classes within traditional high schools. In other contexts, CTE coursework comprises just one aspect of attending a specialized school. Dougherty (2018), for example, explored the impact of attending regional vocational and technical high schools in Massachusetts. This study found evidence of improved high school graduation rates (about 7-10 percentage point increases for high income students, and suggestive evidence of similar effects for low income students), higher pass rates on graduation exams, and increased completion of postsecondary certificate programs.

Several studies have used national survey data collected by the National Center for Education Statistics (NCES) to assess the effects of different types of CTE programs on various educational and economic outcomes. In terms of labor market outcomes, the consensus from these studies is that CTE participation is associated with modest returns in the form of increased earnings and higher employment (Kreisman & Stange, 2018; Meer, 2007; Neumark & Rothstein, 2006).

Related to college readiness, several studies investigate the impact of CTE on high school degree completion and postsecondary educational enrollment. The results are mixed. In terms of high school graduation, one study using data from the NLSY-97 found that CTE participation is associated with reduced rates of high school dropouts (Plank, DeLuca, & Estacion, 2008), meanwhile another, using data from the NELS-88, found that students who chose vocational coursework were no more (or less) likely to complete high school (Agodini & Deke, 2004). Studies of CTE participation's effect on postsecondary enrollment are also inconclusive. Several studies examine the effects of various forms of CTE participation using data from the NLSY-97. One found that certain programs boosted postsecondary enrollment, while others may decrease it (Neumark & Rothstein, 2006). Another study, focused specifically on Tech-Prep programs, found that participation increased rates of high school graduation and two-year college enrollment, but decreased enrollment at four-year colleges (Cellini, 2006). Finally, a third study found that higher ratios of CTE-to-academic courses were associated with reductions in the likelihood of college attendance (DeLuca, Plank, & Estacion, 2006).

To summarize, prior research shows that while CTE participation may be associated with higher employment and earnings, the educational benefits are less clear. Although few studies investigate the impacts on college readiness, studies of educational attainment suggest that CTE participation is not necessarily associated with better (or worse) academic outcomes.

**Career exploration and advising.** Beyond studies of curriculum-based career interventions, a few studies have investigated the effects of interventions in which students explore and plan for future careers (Hughes, Mann, Barnes, Baldauf, & McKeown, 2016). Such programs include activities such as: developing career and education plans; receiving guidance from school counselors; and engaging with computer-based software programs. The consensus from studies of career exploration interventions is that they can increase school engagement and improve school-related attitudes such as self-determination and self-awareness (Hooley, Marriott, & Sampson, 2011). For example, Plasman (2018) used two-level propensity score matching and data from the High School Longitudinal Study of 2009 to study the effect of policies requiring students to complete career/education plans and found that completion of such a plan was positively related to engagement in students' final years in high school. Perry, Wallace, and McCormick (2018) conducted a quasi-experimental evaluation of the career exploration curriculum, Making My Future Work, in urban high school classrooms. The authors found promising results for participating students across

a range of outcomes, including grade point average, school engagement, career preparation, self-determination, and self-awareness.

Prior research also investigates the importance of young people's thinking about their future career and educational plans. A few studies use longitudinal data to explore relationships between adolescents' aspirations and expectations and their later educational and economic outcomes as young adults. While these papers do not assess the effects of career interventions themselves, they provide evidence supporting the underlying assumption that, after controlling for socioeconomic background and academic achievement, the way adolescents think about their futures in education and employment is associated with meaningful differences in their paths as working adults (Hughes et al., 2016). For instance, Staff, Harris, Sabates, and Briddell (2010) studied the effect of occupational uncertainty using data from NELS-88 and found that – controlling for academic achievement, school effort, and socio-demographic background characteristics – youth with undecided career ambitions at age 16 earned significantly lower hourly wages in young adulthood (age 26) than youth with more certain aspirations. Brown, Ortiz-Nuñez, and Taylor (2011) used data from the British *National Child Development Study* to explore the determinants of career expectations formed at the age of 16 and the accuracy of youth's occupational expectations compared to the field in which they are subsequently employed at age 26. Although the authors found that occupational expectations predicted actual employment fields, the relationship was weaker for higher-skilled jobs and students' background characteristics were a stronger predictor of outcomes than were their expectations. The authors did show, however, that career advice – particular when provided by a teacher – impacted young people's expectations, thus suggesting that school-based initiatives have at least some potential to impact employment outcomes.

In terms of college readiness, career exploration interventions appear to hold some promise, especially for developing students' non-cognitive competencies. Taken together, prior studies show that participating students benefit in terms of school-related and intra-personal attitudes. Although not the focus of these studies, it also stands to reason that charting a plan for education beyond high school would benefit students' navigational readiness for college.

**Summary across approaches**

As one of the surest paths to economic stability, higher education has the potential to play an equalizing role, yet preparation for college remains strikingly unequal. Detroit students in particular face an uphill climb on their pathway to college, and so educational and community organizations aim to support college readiness. Fully redressing the barriers students face to higher

education attainment likely requires a multi-faceted, systemic approach. In the meantime, however, career mentoring might offer some support. Both educational theory and empirical evidence provide support for career mentoring as a means to enhancing college readiness

Although no studies to date evaluate the unique combination of supports available to career mentoring participants, existing research demonstrates that similar interventions show promise. Mentoring programs – most of which do not specifically target college readiness – support students attitudinally, with evidence of limited academic impacts as well. Research on mentoring, however, mostly comes from small, non-experimental studies, which makes it difficult to establish a clear causal connection between mentoring and enhanced college readiness. College preparation programs are another approach which, like mentoring, have been shown to have some limited success in improving participants' college prospects. In particular, students with less-certain commitments to college appear most likely to benefit. Finally, career-focused interventions are still another approach. This includes both CTE programs and career exploration/advising interventions. Although linked to slightly better workforce outcomes, the evidence demonstrating CTE participation's effects on educational attainment is mixed. Career exploration and advising shows more promise as an approach to enhancing college readiness, especially in terms of non-cognitive and navigational factors.

## Research context

### Winning Futures career mentoring program

This dissertation evaluates the effects of, and efforts to improve, career mentoring within the context of a particular intervention, the Winning Futures program. Founded in 1994, Winning Futures (WF) is a workforce preparation program that aims to strengthen the entry-level workforce of Metro Detroit. WF provides school-based career mentoring, leveraging more than 80 business partnerships to recruit volunteer mentors from the local professional community. Students can participate in WF throughout high school and their first year of college. Students begin the program as 10th-graders if they are assigned to a class that is chosen for participation. WF partners with classroom teachers to embed their program into students' regular school schedules, rather than requiring students to attend sessions before or after school. Teachers of regular-track, 10th-grade classes at participating high schools are invited to participate. If they agree, teachers volunteer one class period of instructional time per week about every other week. Over the course of a year, students participate in 21 one-hour weekly WF sessions.

During WF sessions, a program facilitator leads the class through a structured goal setting and career exploration curriculum. Students sit at tables with their mentoring group (about three students per mentor) with whom they engage in activities such as the following: playing team-building games; exploring information about various career pathways; setting short-term academic goals; checking students' grades; practicing workplace etiquette (e.g., mock interviews, appropriate online presence); and drafting a 5-year plan towards career goals and postsecondary education. During a typical school year, most WF classes also take fieldtrips to tour a workplace and local college campus.

During the 2019-2020 schoolyear, WF provided its mentoring program to students at seven Metro Detroit high schools. These schools served many students from low-income and racial minority backgrounds (see Table 2.2 for a summary). Students in schools served by WF were, on average, somewhat less-prepared academically for college and enrolled in higher education at lower rates than students in the state overall. In the year before the study, one third of the students in WF schools took and passed advanced courses (compared to a state-wide average of 45 percent) and about half (56 percent) continued their education after graduation (compared to 68 percent state-wide).

**Research relationships**

I conducted my dissertation studies through a research partnership between WF and the University of Michigan's Youth Policy Lab (YPL). The two organizations first collaborated in Fall 2016 when WF representatives initially sought program evaluation support. At that time, YPL researchers provided a report summarizing WF students' pre- to post-survey responses. These pilot analyses demonstrated increases in participants' pre- to post-survey responses, suggesting that WF has the potential to improve college-going attitudes.

In Spring 2019, WF again sought YPL's support. In preparation for the design of an experimental program evaluation, I informally observed several WF classes, wrote a research proposal (which WF accepted), and received IRB approval of the study design. The dissertation studies I originally proposed laid the groundwork for a multi-year evaluation of WF with final results anticipated in Fall 2024. The original design tracked two student cohorts from their sophomore year of high school through their first post-high school year. Outcomes included the following: survey-based measures of college-ready attitudes; high school grade-point averages and average attendance; course-taking patterns (i.e., enrollment in career-focused courses in upper high school grades); and postsecondary educational enrollment. I applied for and obtained permission to use the K-12 and

postsecondary educational records for all students in the study sample (WF and comparison students).

I maintained a strong research relationship with WF leaders throughout the course of my dissertation studies. During the initial months of the research projects, I attended several meetings between WF representatives and school leaders to support the random selection of participating classes. I continued to meet with WF leaders about every other week for the duration of the study. Our collaboration was essential to sustaining the studies through the data collection challenges posed by the abrupt shift to remote instruction due to the COVID-19 pandemic. I am extremely grateful to my research partners for their consistent partnership in addressing research design issues; sharing their reflections and insights on initial drafts of research findings; and staying the course with rigorous program evaluations despite the set-backs the organization faced during the pandemic.

**Adaptations due to the COVID-19 pandemic**

When the COVID-19 pandemic began in Spring 2020, it left no aspect of daily life unchanged, including the WF program and this dissertation. WF program leaders took swift action to ensure a continuity of support for participating students. Immediately following the suspension of in-person instruction, WF staff adapted their outreach to connect with participants virtually. Mentors received directions to remain in contact with their mentees via text messaging, email, or other forms of remote communication. Initially, WF staff adapted their curricular plans with the expectation that in-person instruction would eventually resume. When it became clear that schools would not reopen, plans were quickly adapted for continued online engagement with students. The WF worked tirelessly to stay connected to as many students as possible during the pandemic, especially during the final months of the 2019-2020 schoolyear.

It is important to note that the majority of the analyses I present in my dissertation assess the pre-pandemic effects of the WF program. Several data sources were collected before the pandemic began (e.g., Semester 1 grades, a mid-point survey collected in February 2020). I worked with WF to collect the remaining data sources as quickly as possible during the weeks following the shift to online mentoring. Schools closed in mid-March 2020, and participants received the end-of-program survey (planned for May 2020) on April 8, 2020. Focus groups and interviews were held immediately after the WF program ended (in mid-May) and I asked participants to reflect separately on their experiences in the program both before and after schools closed.

Unfortunately, personal and technological barriers prevented many students from fully engaging with school and school-based programs, like WF, during Spring 2020. As a consequence,

the data sources I collected to explore students' perspectives in WF may not present a representative picture of the program. In particular, my data may overlook the views of students who faced the greatest barriers to school engagement or who were less-connected to the WF program before the pandemic. Fortunately, mentors and teachers were much more responsive, and so my findings based on their input likely present a more complete picture of the WF program. Within each dissertation chapter, I provide additional details about how the data collection challenges I faced likely impacted the relevant study sample.

**Contributions of the current studies**

This dissertation makes a few key contributions to the field. Broadly speaking, the dissertation evaluates the effects of, and efforts to improve, career mentoring, with a particular focus on enhancing college readiness. A sizeable body of research documents the effects of both mentoring (DuBois & Karcher, 2014; Herrera et al., 2011; Raposa et al., 2019) and career-focused interventions (Hooley et al., 2011; Perry & Wallace, 2012). However, little research conclusively shows how either type of intervention may impact students' readiness for and attitudes towards postsecondary education. These studies help to fill this gap and are the first, to my knowledge, to explore a program that combines these two types of intervention.

This dissertation also contributes to a more holistic understanding of what it means to prepare students for college. Whereas traditional measures of college readiness primarily rely on academic indicators (Porter & Polikoff, 2012), the current studies explore effects across three domains: academic, non-cognitive, and navigational. The objectives of the WF program aligned with each of these three aspects of readiness. Table 2.1 displays the data sources I used to measure each aspect of college readiness. I collected quantitative measures of students' academic performance (grades) and attitudes (self-reported survey measures), and qualitative data that shed light on all three components of college readiness.

Another contribution of this dissertation is an understanding of the mechanisms through which career mentoring operates. Although prior research links participation in career development activities to a number of positive youth outcomes dropout (Dougherty, 2018; Kemple & Willner, 2008; Perry, Wallace, & McCormick, 2018; Plank et al., 2008; Plasman, 2018), past studies often fail to explore what makes these interventions successful. Without this insight, it is difficult to know which aspects are the key ingredients, and in particular, how career mentoring might enhance college readiness. My dissertation manuscripts use Social Cognitive Career Theory to frame findings on the key mechanisms through which career mentoring supports students.

Finally, prior evaluations of mentoring programs frequently conclude that mentoring has only a small to moderately sized effect (DuBois et al., 2011; Raposa et al., 2019). It is important, thus, to identify effective methods of program improvement. During the pandemic, many mentoring programs, including WF, shifted to a remote mentoring model. In many cases, these changes will likely have a lasting effect on the way students and mentors connect. Thus, it is particularly necessary to identify methods of program improvement that make use of virtual methods of communication. Findings from my qualitative evaluation of WF also align with this goal. As I show in Chapter 4, students identified virtual mentors' virtual outreach as a particularly helpful support.

**Overview of manuscripts**

This dissertation is organized into three manuscripts, each of which presents findings from an empirical study. The first manuscript, Chapter 3, presents results from an experimental evaluation of the WF career mentoring program. Results of a randomized control trial assessed WF's impact on students' academic performance and college-ready attitudes. Classrooms participating during the 2019-2020 schoolyear were randomly selected. Outcomes measured included: students' first semester grades, and self-reported self-efficacy, growth mindset, goal orientation, perseverance, and adult support. The results suggested that career mentoring enhances college readiness both attitudinally and academically, although many of the findings lacked statistical significance.

The second manuscript, Chapter 4, presents a subjective evaluation of WF. Using a social validity framework, I share the perspectives of WF participants on the social importance of the program's effects and the perceived mechanisms through which the program benefits students. I facilitated a total of fifteen focus groups and interviews with participating students, mentors, and classroom teachers. The results supported the quantitative findings, presented in Chapter 3, that career mentoring enhances college readiness, particularly in its effects on non-cognitive and navigational factors. Additionally, the findings highlight several avenues through which career interventions operate. Importantly, I find that strong mentoring relationships provide an essential foundation upon which the impacts of career mentoring depend.

The final manuscript, Chapter 5, explores how career mentoring programs might enhance the benefits students receive by encouraging more frequent student-mentor virtual communication. I present the results of an experiment testing a light-touch nudge intervention designed to encourage mentors to reach out more often via text message, email, or phone. Unexpectedly, the results showed that although there were no differences in the overall frequency of mentors' outreach, encouraging mentors to reach out resulted in lower ratings of student responsiveness (both self-

reported and mentor-reported) and less-frequent student-initiated outreach. Additionally, mentors who were encouraged to reach out gave worse ratings of their relationships with students at the end of the program, and students of treated mentors gained less from the program in terms of their college-ready attitudes. Exploratory analyses revealed that the mentor nudges may have shifted communication away from phone calls and towards text-based methods, or capped the number of touchpoints pairs sent per week. Taken together, the study's findings underscore the importance of carefully considering the content of nudges to ensure that mentor reminders ultimately enhance student support.

Table 2.1 Components and measures of college readiness

| **Cognitive academic factors** | **Non-cognitive factors** | **Navigational factors** |
|---|---|---|
| • Content knowledge<br>• Academic skills | • Self-concepts (e.g., self-efficacy, self-esteem, growth mindset)<br>• Self-management (e.g., persistence, goal setting, time management) | • College knowledge<br>• Relationships to others / Support network |
| ***Common measures*** | | |
| • High school grade-point averages; SAT, ACT scores; End-of-course exams; Completion of key coursework (e.g., Alg. 2) | • Survey-based self-reports; various constructs measured | • No agreed-upon measures |
| ***Current studies quantitative measures*** | | |
| • First semester grades in 10th-grade courses | • Self-reported: self-efficacy, growth mindset, persistence, goal orientation | • Self-reported adult support |
| ***Current studies qualitative measures*** | | |
| Students', mentors', and teachers' perceptions of:<br>• Academic benefits of WF | • Attitudinal benefits of WF | • College and career planning |

Figure 2.1 Social cognitive career theory model of person, contextual, and experiential factors affecting choice behavior.
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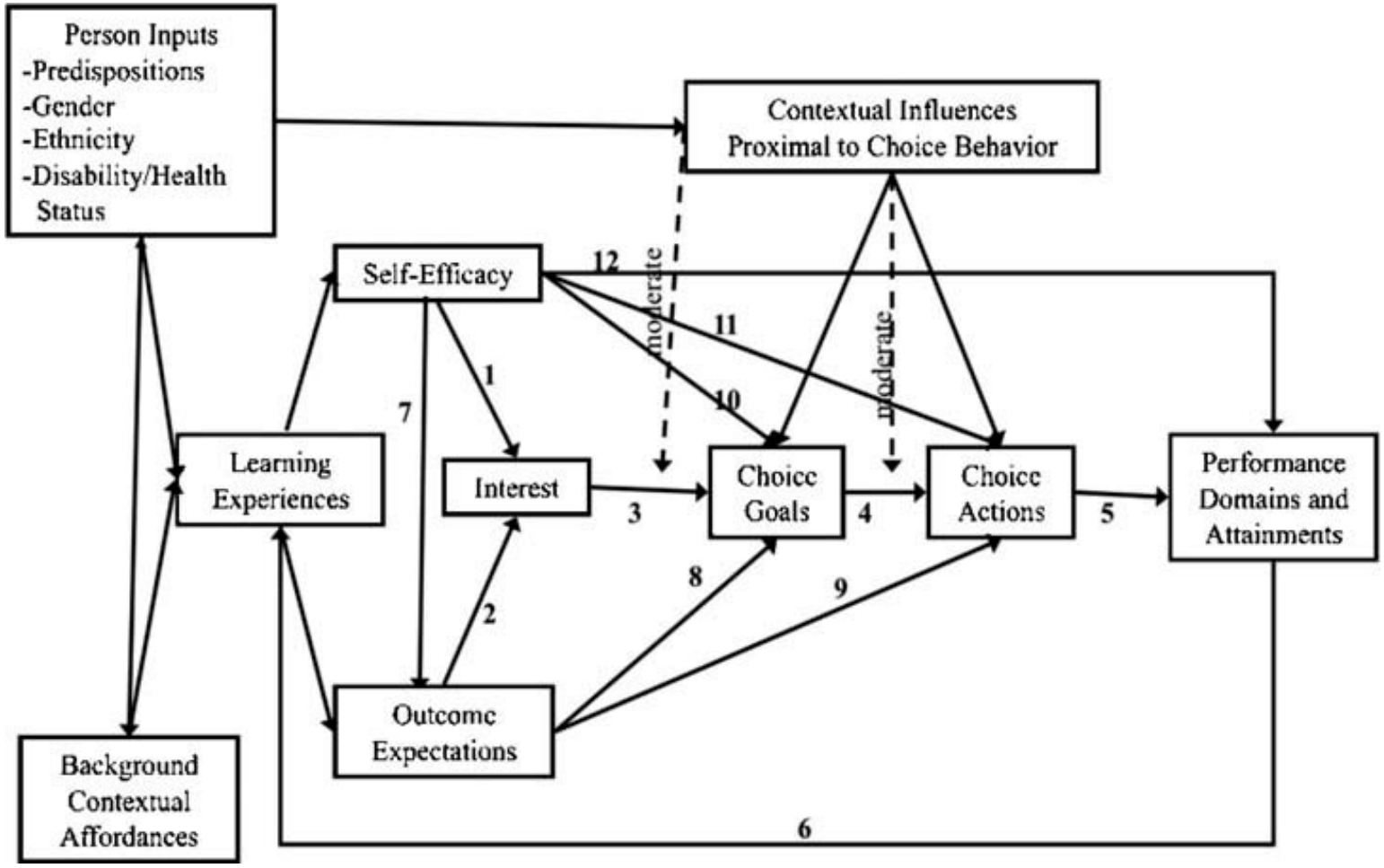


Table 2.2 Average student demographics in schools served by Winning Futures

| | Proportion / Mean |
|---|---|
| Economically disadvantaged | 0.74 |
| White | 0.19 |
| Black | 0.67 |
| Latinx | 0.07 |
| Other races | 0.07 |
| On-track attendance | 0.78 |
| Proficient on state tests | 0.16 |
| Take, pass advanced classes | 0.33 |
| Average SAT score | 871 |
| Graduation rate | 0.81 |
| Postsecondary enrollment rate | 0.56 |
| Average school size | 1,022 |
| Years participating in WF | 11 years (min=1, max=25) |

Note: Summary of WF school characteristics in prior school year (2017-18).

## Chapter 3

## Can Career Mentoring Increase the Pool of College-Ready Marginalized Students? An Experimental Evaluation of the Winning Futures Career Mentoring Program

A college degree is more important for economic mobility today than ever before, yet access to higher education remains unequal. Low-income and racial minority students face obstacles which make them less likely to adequately prepare for, attend, and complete college (Bailey & Dynarski, 2011; Bowen, Chingos, & McPherson, 2009; Engle & Tinto, 2008). These young people have the greatest need for, yet the least access to guidance counselors and college-educated role models who can help them navigate postsecondary college and career pathways (Avery, Howell, & Page, 2014; Hamrick & Stage, 2004; Roderick et al., 2008). In light of uneven supports and opportunities, I use the term "marginalized" to describe students who have been underserved by educational systems and, consequently, are underrepresented in higher education (Solórzano & Villalpando, 1998). Significant policy efforts have been made to help remove barriers to college access for marginalized students (Page & Scott-Clayton, 2016; White House, 2014); however, such opportunities often target high-performing students who are already qualified to attend college (see for examples, Castleman & Page, 2015; Hoxby & Turner, 2013)

Upward mobility, including access to higher education, is particularly limited for young people from Detroit where a long history of racist policies and structures have resulted in highly racially segregated housing, concentrated urban poverty, and disinvestments in public schools (Boyle, 2001; Darden et al., 1987; Mirel, 1998; Sugrue, 2014). Perhaps as a consequence, many Detroit high schools do not or cannot provide all students access to intensive college prep supports (e.g., college readiness classes like AVID, in-depth college counseling for every student). In recent years, about half of Detroit's graduating students enrolled in postsecondary education after high school, even though the vast majority were under-prepared for college (Brockman et al., 2021). Not surprisingly, the consequence is that many Detroit college enrollees do not persist, and very few ultimately earn degrees. Given that higher education is increasingly a prerequisite to workforce participation, expanding college readiness is an equity imperative: how can we enhance the college readiness of high school students from Detroit?

Career mentoring may be one answer. Whereas traditional college-prep programs focus on academic preparation and college entrance exam performance, career-focused mentoring offers a holistic approach to postsecondary readiness. Such programs pair participating youth with caring adults who can be advocates and role models. Studies of more general youth mentoring programs like the Big Brothers Big Sisters program show that through their role modeling, tutoring, and encouragement, mentors have positive, albeit modest, impacts on youths' school-related attitudes, behaviors, and academic outcomes including grades and attendance (Herrera et al., 2011; Rhodes et al., 2000). Career mentoring participants also benefit from the opportunity to explore and plan for careers. Like other career exploration programs – such as apprenticeships or career and technical education classes – career mentoring offers an opportunity to explore career pathways and hone educational plans by identifying what certain desired careers require in terms of postsecondary education and training (DeLuca et al., 2006). Past studies find that similar school-based career development programs increase students' engagement and reduce their risk of dropping out (Plank et al., 2008; Plasman, 2018).

Yet the extent to which either career exploration or mentoring enhances college readiness remains relatively unexplored. Very few studies have examined whether mentoring relationships can improve young adults' attitudes towards or academic preparation for college (Woods & Preciado, 2016). Nor has research conclusively shown how career interventions impact college prospects (DeLuca et al., 2006; Kreisman & Stange, 2018). No studies, to my knowledge, explore the effect of combining these two types of interventions.

**Background: Career mentoring as an approach to enhancing college readiness**

"College-ready" students are prepared to enter postsecondary education without the need for remediation and to navigate the system to obtain a degree (Conley, 2012; Page & Scott-Clayton, 2016; Roderick et al., 2009). Various conceptualizations of college readiness acknowledge that adequate preparation requires skills and knowledge across at least three domains: cognitive academic factors, non-cognitive factors, and navigational or transitional factors (Conley, 2007; Connect Ed California, 2012; Duncheon, 2015; Roderick et al., 2009). My conceptual framework, presented in Chapter 2, provides a detailed description of each of these domains.

Career mentoring offers a promising, yet relatively unexplored, approach to enhancing college readiness. I am not aware of any studies of career mentoring in school contexts nor any that explore whether this type of mentoring effects college preparation. The small number of studies that investigate similar forms of school-based career development – like career/education planning and

career exploration activities – find that these interventions increase school engagement and improve college-going attitudes (Hooley et al., 2011; Perry et al., 2018; Plasman, 2018).

Youth mentoring, on the other hand, is well-researched and has been shown to support a host of personal and academic outcomes (DuBois et al., 2002; DuBois et al., 2011; Raposa et al., 2019). In particular, studies of programs serving youth identified as "disadvantaged" and "at-risk" show that these groups benefit from supportive relationships with adult role models (Herrera, DuBois, & Grossman, 2013; Tolan, Henry, Schoeny, & Bass, 2008). In postsecondary settings, mentoring has been shown to reduce "summer melt" in enrollment (Castleman & Page, 2015), and increase college graduation rates, with dramatic effects found for some programs (Bettinger & Baker, 2014; Scrivener et al., 2015).

Only a few studies have looked directly at the impact of mentoring on college readiness or related outcomes. Rodríguez-Planas (2012) reported experimental results of the Quantum Opportunity Program (QOP) which offered low-performing high school students four years of mentoring, in addition to educational services and financial incentives. This program was found to increase the rate at which students graduated high school and enrolled in college. Woods and Preciado (2016) studied mentoring of underrepresented students in the context of a high school SAT prep program and found that stronger student-mentor relationships were linked to improved beliefs and expectations about college.

**Current study**

Taken together, prior research suggests that career mentoring programs show promise as a means of providing support and guidance, with demonstrated success improving outcomes for marginalized students. The potential for career mentoring interventions to enhance and equalize college readiness, however, remains under-explored. The current study aims to fill this gap. Specifically, this manuscript presents the results of an experimental evaluation of the Winning Futures (WF) program. The experiment evaluated the effects of participating in career mentoring on several measures of college readiness, including students' academic performance (grades) and the following self-reported attitudes: self-efficacy, growth mindset, goal orientation, perseverance, and adult support. The following research questions guided the analysis:

1. What was the effect of WF participation on students' grades?
2. What was the effect of WF participation on students' self-reported college-ready attitudes?
3. Among students who participated in WF, which student or program characteristics were linked to stronger post-program attitudes?

## Methods

### Randomization

A feature of WF's model is that it serves students during the school day, embedding access to mentoring into students' regular schedules rather than requiring them to be available to meet with mentors outside of school hours. To accomplish this, WF partners with classroom teachers who voluntarily give up instructional time – roughly one class period every other week from October through May. Since entire classes (e.g., Ms. Brockman's 3rd-period World History class) participate as a group, classrooms were the most appropriate level at which to randomize participation.

Classrooms were eligible to be selected for WF participation if they met several criteria set by the WF program leaders. First, the program is open to students in 10th-grade (after their initial year, students have the option to continue participating in a version of the program for 11th and 12th-graders). Because of its goal to expand college readiness, WF intentionally partners with teachers of regular-track classes (i.e., non-honors and non-AP). Finally, to accommodate mentors' work schedules, WF only offers its sessions in the morning which limited participation to classes offered during earlier class periods, usually second and third hours.

I worked with WF staff and school administrators to identify eligible classrooms at each school. Seven schools offered the WF program during the 2019-2020 schoolyear, and we were able to randomize WF participation at three sites. In most cases, principals identified two eligible classrooms per class period; among each pair, I randomly selected one to participate (treatment) and the other not (comparison). At three schools, WF served the entire 10th-grade and so no comparison group existed. At a fourth school, only one teacher taught eligible classes during the morning class periods. I included this teacher's afternoon classes as a non-experimental comparison group.

### Participants

The sample originally included students in 16 participating classes ($N$=493 students) and 8 comparison classes ($N$=217 students). Appendix Table A.1 displays descriptive statistics for the full experimental sample and assesses the baseline equivalence of the treatment and comparison groups.

Due to low response rates on the end-of-program survey and data sharing restrictions at several schools, the final analytic sample included only a subset of the original participants. Three schools provided data on students' grade-point averages and so the analyses of WF program impacts on grades included students from 6 participating classes ($N$=188 students) and 6 comparison classes ($N$=142 students). The shift to online instruction during the COVID-19 pandemic left many

students disconnected from their classes and the WF program. As a result, few students responded to the end-of-program survey (32 percent overall response rate), and response rates in comparison classrooms were particularly low (*N*=29 students, 13 percent response rate; compared to *N*=220 participating students, 44 percent response rate). Both the rates of overall and differential non-response were beyond the threshold established by the What Works Clearinghouse for interpretation under optimistic assumptions (What Works Clearinghouse, 2020). As a consequence, the results of these analyses should be interpreted with caution as the estimated program impacts may be biased by differential response patterns across treatment statuses.

Low survey response rates also raises the concern that the analytic sample no longer resembles the original study sample in terms of students' background characteristics. To assess the extent to which this was the case, I examined whether response rates varied along the lines of students' demographic characteristics (gender, race, FRPL status, and parent education) or by school. To do so, I regressed an indicator of whether students responded to the post-survey (1=responded, 0=no response) on measures of students' background characteristics and a set of school fixed-effects. Using linear OLS regressions with standard errors clustered within classrooms, I first regressed the post-survey response indicator on each measure covariate individually, and then all together in one regression. As the results in Appendix Table A.2 show, female students and students whose parents had completed more postsecondary education were more likely to respond to the post-program survey. Compared to a reference group, one of the schools also recorded a higher survey response rate. These findings mirror the differences between the analytic and original samples that can be seen by comparing the summary statistics displayed in Appendix Table A.1 (original sample) and Table 3.1 (analytic sample). The fraction of the sample that was female and whose parents had earned a BA was higher among students in the analytic sample than the original sample. However, the differences were small (e.g., 46 percent of the original sample identified as female, compared to 47 percent of the analytic sample. Moreover, as I describe in the next paragraph, I did not observe imbalances across treatment statuses in terms of students' gender or parental education.

To ensure that the treatment and comparison groups appeared similar in terms of their baseline characteristics, I tested for balance across treatment statuses on the following covariates: gender, race, free or reduced-price lunch status, parents' education level, and baseline college-ready attitudes. Table 3.1 presents descriptive statistics of the analytic samples and assesses the baseline equivalence of the treatment and comparison groups. For the most part, students in participating

and comparison classrooms appeared similar, although the racial/ethnic background of students across treatment status did differ. Specifically, more of the students in WF classrooms were Black or another non-White race, and fewer were White. The magnitude of these differences were outside the range that the What Works Clearinghouse considers acceptable with statistical adjustment ($0.05 \leq$ Effect size $\leq 0.25$. Testing for balance on multiple covariates increases the probability that at least one difference will be statistically significant. I therefore assessed the joint significance of all baseline imbalances as well, focusing on the *F*-statistic for assessing baseline equivalence. Based on the results (*F*-statistic = 0.66, $p = 0.75$ for the analytic sample in survey-based analyses; *F*-statistic = 04.01, $p = 0.0013$ for the analytic sample in analyses of students' grades), I failed to reject the null hypothesis of baseline equivalence in one sample but not the second. To adjust for the baseline imbalances that I observed, all final analyses controlled for all of the student characteristics listed in Table 3.1 and each survey-based analysis also controlled for the pre-survey measure of the outcome.

**Measures**

To evaluate the effects of participating in the WF program on students' college readiness, I focused on two main outcomes: grade-point averages and self-reported attitudes. Schools provided report cards from the first semester (December 2019) with students' letter grades in each of their 10th-grade courses. Students responded to pre- and post-surveys which included the following validated scales for college-going attitudes: self-efficacy, growth mindset, goal orientation, perseverance, and adult support.

On the pre-survey, students also provided their gender, race/ethnicity, receipt of free or reduced price lunch (FRPL), and parents' educational background. This background information was used to create an indicator for whether the student's race/ethnicity was the same or different from their mentors (match=1, not a match=0). Additionally, two items from the High School Longitudinal Survey (Duprey et al., 2018) measured students' postsecondary attainment expectations and their immediate post-high school plans. Finally, students rated their initial interest in participating in the Winning Futures program (1=Low interest, 3=High interest).

Students who participated in WF completed a mid-point survey in January 2020 rating their relationships with their mentors. Items from the *Youth Mentoring Survey* (Harris & Nakkula, 2018b) measured students' relational and instrumental relationship quality. Relational quality refers to the degree to which students felt happy, close, and satisfied with their mentoring relationship. Relational quality was assessed by 14 items ($\alpha$=0.92) such as, "My mentor and I are close (very good friends)"

and "My mentor makes me feel special." The response categories for these items ranged from, "1=Not at all true" to "4=Very true." Students also rated the instrumental, or growth-oriented, quality of their mentoring relationships. Instrumental quality was assessed by eight items (α=0.88) such as, "I talk with my mentor when I have problems or things that worry me" and "My mentor helps me get in less trouble (make better decisions, behave better, etc.)."

WF leaders measured students' college-ready attitudes on a pre-program survey at the start of the school year (September 2019) and a post-survey at the end of in-person mentoring (April 2020). I used mean-imputation to address missing data on all baseline measures. Below I describe each outcome in greater detail, and Appendix Table A.3 displays sample items, information about internal consistency, and the dates of data collection.

**Self-efficacy.** Self-efficacy refers to individuals' belief in their ability to "mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands" (R. Wood & Bandura, 1989, p. 408). Research distinguishes between task-specific self-efficacy and general self-efficacy (GSE), which refers to individuals' overall perception of their ability to perform tasks across a variety of situations (Judge, Erez, & Bono, 1998). GSE has been shown to relate strongly to other self-evaluation constructs, including locus of control and neuroticism and especially self-esteem (Chen, Gully, & Eden, 2001). This study measured students' general self-efficacy using the *New General Self-Efficacy Scale* (Chen et al., 2001). Seven items (baseline α=0.91; post-survey α=0.9) asked respondents to rate their agreement, on a five-point scale from "Strongly disagree" to "Strongly agree," with prompts such as, "When facing difficult tasks, I am certain that I will accomplish them." he NGSE scale has been shown to have strong internal consistency (published alpha levels ranging from α=0.86 to 0.90; Chen et al., 2001).

**Growth mindset.** A growth (versus fixed) mindset refers to an individual's core beliefs about the nature of intelligence. Individuals who hold growth mindsets, also referred to as incremental theorists, believe that intelligence is malleable and can be developed over time. By contrast, individuals with a fixed mindset, or entity theorists, view intelligence as an inborn, unchangeable trait (Dweck, 2010). Research shows that youths' orientation towards intelligence affects the way they respond to challenges, particularly in academic settings (Blackwell, Trzesniewski, & Dweck, 2007). For individuals endorsing entity theories, the belief in a fixed, uncontrollable intelligence orients them towards measuring that ability or giving up and withdrawing if the outcomes seems negative. For individuals subscribing to an incremental theory, on the other hand,

the belief that their abilities can be developed through their effort orients them towards challenging tasks that promote skill development (Dweck & Leggett, 1988)

This study measured growth mindset with items from the *Revised Implicit Theories of Intelligence (Self-Theory) Scale* (De Castella & Byrne, 2015). Three items (baseline $\alpha$=0.82; post-survey $\alpha$=0.87) each with a four-point scale ranging from "Strongly disagree" to "Strongly agree" gauged students responses to prompts such as, "You can learn new things, but you can't really change your basic intelligence." The items were tested in a diverse sample of youth (grades 10-12) and found to have good internal consistency (published alpha of $\alpha$=0.87; De Castella & Byrne, 2015).

**Goal orientation.** Goal orientation is defined as an adolescent's motivation and ability to make viable plans and take action toward desired goals. Adolescents who report higher levels of goal orientation tend to be more cognitively engaged in school-related tasks and act out less than their peers with lower levels of goal orientation (Roeser, Strobel, & Quihuis, 2002). Planful competence in adolescence, a similar construct to goal orientation, has been shown to be related to marital stability, educational attainment, life satisfaction, and career success (Shanahan, 2000).

The goal orientation survey items were developed by the *Flourishing Children Project* which assessed positive youth development across multiple contexts (Lippman et al., 2014). The seven items related to goal orientation (baseline $\alpha$=0.85; post-survey $\alpha$=0.85) each used a five-point scale. Five of the items used "Exactly like me" to "Not at all like me" response categories, and the remaining two used a frequency response scale from "None of the time" to "All of the time." Students responded to prompts such as, "It is important to me that I reach my goals" and "I know how to make my plans happen." Psychometric analyses conducted using a sample of U.S. adolescents that was diverse in terms of age, income, race, and gender found that both scales achieved alpha levels of $\alpha$ = 0.88 (Lippman et al., 2014).

**Perseverance.** Perseverance refers to the ability to pursue and accomplish one's goals, even in the face of obstacles. (M. L. Kern, Benson, Steinberg, & Steinberg, 2016). It is a component of the Big Five personality trait of conscientiousness, and comprises the drive component of "grit," which includes both perseverance and passion for long-term goals (Duckworth, Peterson, Matthews, & Kelly, 2007). Prior research shows that across multiple contexts (the military, workplace sales, high school, and marriage) individuals high in perseverance were more likely to graduate from school, stay in their jobs, and remain married (Eskreis-Winkler, Duckworth, Shulman, & Beal, 2014).

The measure of perseverance used in this study was from the *EPOCH Measure of Adolescent Well-Being*, which assesses five positive psychological characteristics: engagement, perseverance,

optimism, connectedness, and happiness (M. L. Kern et al., 2016). The four items (baseline α=0.8; post-survey α=0.79) measuring perseverance refer specifically to students' belief that they can complete school-related tasks. Two subconstructs were included, each with two items. The first scale had frequency response categories, "Almost never" to "Almost always," and the second used response categories, "Not at all like me" to "Very much like me." The measure included prompts such as, "Once I make a plan to get something done, I stick to it." Across multiple samples of U.S. youth, the internal consistency for these scales had alpha levels ranging from α=0.72 to 0.85.

**Adult support.** Adult support gauges students' support from caring adults outside their families. This measure was adapted from the *California Healthy Kids Survey: Resilience & Youth Development Module* (WestEd, 2008) which assesses the "community protective factors" that students experience. Six items (baseline α=0.89; post-survey α=0.87) asked students to respond using a scale from "Not at all true" to "Very much true" to statements about adults outside their family or school, such as: "There is an adult who really cares about you," and "There is an adult whom you trust."

**Empirical Strategy**

**Program impacts.** I computed the effects of WF participation by comparing the academic performance and self-reported attitudes of WF participants with those of the comparison group. I estimated the effects using OLS regressions with robust standard errors clustered within classrooms. I specified intent-to-treat (ITT) models of the following general form:

$$Y_i = \beta_0 + \beta_1 Y_{it-1} + \beta_2 Z_c + X_i + \delta_s + \varepsilon_{ics} \qquad (1)$$

where $Y_{ics}$ is an outcome measure for student $i$ in classroom $c$ at school $s$; $Z_c$ indicates whether the student's class participated in WF ($Z_c$=1) or not ($Z_c$=0); $X_i$ is a vector of student-level pretreatment covariates (gender, race, FRPL status, and parent education); $\delta_s$ is a school-fixed effect, and $\varepsilon_{ics}$ is an idiosyncratic error term. In models estimating impacts on students' self-reported attitudes, $Y_{it-1}$ is a baseline measure of the outcome. $\beta_2$ estimates the average effect of participating in WF. Alternative specifications included a random intercept, $u_c$, to account for clustering of students within classrooms instead of clustered standard errors. For ease of interpretation, I standardized the survey-based outcome measures (self-efficacy, growth mindset, goal orientation, perseverance, and adult support) to the comparison group mean and standard

deviation such that the estimated treatment effects represent effect sizes. Estimated impacts on grade-point averages are reported in their original units (scale from 0-4; A=4.0, B=3.0, etc.).

**Descriptive analyses.** I analyzed the post-survey scores of WF participants to see whether certain groups of students or their experiences in the WF program were correlated with higher ratings at the end of the program. I estimated these results using OLS regression with robust standard errors clustered within classrooms. I specified models of the following general form:

$$Y_i = \beta_0 + \beta_1 Y_{it-1} + \beta_2 \lambda_i + \delta_s + \varepsilon_{ics} \qquad (2)$$

where $Y_{ics}$ is an outcome and $Y_{it-1}$ is a pre-survey measure for student $i$ in classroom $c$ at school $s$, $\delta_s$ is a school-fixed effect, and $\varepsilon_{ics}$ is an idiosyncratic error term. $\lambda_i$ represents measures of students' background characteristics, postsecondary education plans, and mentoring relationship ratings. Specifically, I examined the correlation between the outcomes and the following student variables: gender, race, FRPL status, parent education, ultimate postsecondary attainment expectations, immediate post-high school plans, baseline interest in the WF program, student-mentor race match, midpoint mentoring relational quality, and midpoint mentoring instrumental quality. $\beta_2$ estimates the correlation between each outcome and the student or mentoring characteristic of interest. I first estimated the association between the outcomes and each predictor variable on its own. Next, I included all the predictors in the model at once. As in earlier analyses, alternative specifications tested the robustness of the findings to the inclusion of a random intercept, $u_c$, to account for clustering of students within classrooms instead of clustered standard errors, and I reported results in standardized units for ease of interpretation.

## Results

### Impacts of the Winning Futures program

Table 3.2 presents the impacts of participating in the WF program on students' academic performance (Semester 1 GPA) and college-ready attitudes (self-reported post-survey measures). Impacts on attitudes are reported in effect sizes. I found that both first semester grades and end-of-program attitudes were higher for students who participated in WF compared to students in comparison classrooms. Although most of the results were not statistically significant, the trend across outcomes was that WF had a small positive effect.

In terms of academic impacts, WF participants earned higher first semester grades than comparison group students. Although the differences were not statistically significant, average first semester GPAs were 0.28-points higher for WF students, compared to an average GPA of 2.05 among comparison group students (on a 0-4 scale; effect size = 0.32, p-value = 0.193). This increase is roughly the equivalent of raising one class grade from a C to an A.

Analyses of students' self-reported attitudes also suggested that WF had a small, positive impact on college readiness. WF students' self-efficacy scores were, on average, 0.25 points higher (1-5 scale) than comparison students, about a 6.5 percent increase (effect size = 0.34, p-value = 0.008). On average, perseverance scores were 0.22 points higher (1-5 scale), also about a 6 percent increase (effect size = 0.26, p-value = 0.120). Growth mindset, goal orientation, and adult support scores were not impacted by WF participation (statistically non-significant effect sizes near zero). The magnitude of all of the estimated effects of WF on students' attitudes was small and, with the exception of self-efficacy, the results were not statistically significant.

**Descriptive analyses: Correlates of stronger post-program attitudes**

In addition to the WF program effects, I also examined the post-program attitudes of WF participants to assess whether students from different backgrounds, with varying levels of pre-WF college commitment, or who formed stronger mentoring relationships rated their college-ready attitudes higher or lower. Table 3.3 shows the associations between the students' self-reported college-ready attitudes and each predictor. Column (1) shows the correlation between the outcome and each predictor by itself; column (2) shows the results of a regression in which all of the predictors were included jointly.

As the results in Table 3.3 show, students' background characteristics and post-high school plans were not consistently related to higher or lower scores, with three possible exceptions. First, compared to their Black peers, White students and other students of color reported, on average, higher perseverance scores. Second, students whose parents had attained at least a BA self-reported slightly higher levels of self-efficacy and growth mindset. Third, students who expected to earn at least a BA degree reported slightly lower levels of adult support and positive goal orientations at the start of the year. Given the small magnitude of the results, and the likelihood that at least some statistically significant differences will emerge when assessing the results for many outcomes, these results do not suggest meaningful differences along the lines of student background characteristics or baseline postsecondary education plans.

I did, however, find that one characteristic of program participation was linked to higher post-program scores: stronger student-mentor relationships. Specifically, students whose mid-point ratings of the quality of their mentoring relationships were more positive also self-reported higher levels of self-efficacy, goal orientation, perseverance, and adult support. As just one example, a one-point increase in mentoring relational quality (1-6 scale) was associated with a 0.4-point increase (1-5 scale) in average self-efficacy scores. One possible interpretation of these results could be that some students felt more positively about WF overall, and always reported higher ratings across all survey measures at every time point (including both the attitude and mentoring relationship measures). Another possible interpretation, however, is that stronger mentoring relationships support students' growth. Although establishing a causal relationship between stronger relationships and better mentoring outcomes is beyond the scope of this analysis, this finding warrants further investigation in future research.

## Discussion

To summarize the main findings: career mentoring appeared to have small, but positive, impacts on students' readiness for college as measured by their grades during the program and their self-reported attitudes at the end of the year. These results suggest that career mentoring may be an effective strategy for expanding access to college by increasing students' readiness either in terms of their academic performance or their non-cognitive competencies.

Additionally, I found that students who experienced stronger mentoring relationships, as gauged by a mid-year measure, reported stronger college-ready attitudes at the end of the program. Although not necessarily a causal link, future research might explore the relationship between the mentoring bonds that pairs form and the attitudinal benefits of mentoring that students receive. In Chapter 5, I present results of a program improvement intervention that builds on this finding. In that study, I evaluated an intervention which aimed to strengthen mentoring bonds, and subsequently enhance the benefits mentored youth receive, by encouraging more frequent mentor-student communication.

Unfortunately, limited data collection prevented me from conducting the rigorous evaluation of the WF program that I originally planned. In addition to the measures I observed, the original study would have explored the impacts of WF on both first and second semester grades, and students' course-taking patterns as 11th-graders. Although beyond the scope of my proposed dissertation, the experimental evaluation would have also continued to track students through their initial enrollment in postsecondary education. Not only were the outcomes I could report limited,

but because I only collected survey responses from a small and imbalanced sample of students, the final results lacked the statistical power and internal validity necessary to detect meaningful program effects or support causal claims related to the outcomes I did observe.

Despite these limitations, this study provides suggestive evidence of the potential for career mentoring to improve students' readiness for college in terms of both academic performance and non-cognitive competencies. Additional studies should confirm these findings with larger and balanced samples. Further research is also needed to explore the mechanisms through which career mentoring benefits students, and to understand whether the impacts extend to postsecondary education enrollment and attainment. In my next manuscript, Chapter 4, I turn to the mechanisms through which career mentoring enhances students' readiness for college

Table 3.1 Summary statistics and treatment-comparison group balance on baseline characteristics

**Panel A. Analytic sample with grades data available**

| Variable | Min | Max | Overall mean/prop. | SD | Treatment group mean/prop. | Comparison group mean/prop. | Difference | Effect size of diff. | *p*-value of diff. |
|---|---|---|---|---|---|---|---|---|---|
| ***Student characteristics*** | | | | | | | | | |
| Female | 0 | 1 | 0.51 | 0.49 | 0.50 | 0.56 | -0.06 | -0.12 | 0.53 |
| Black | 0 | 1 | 0.60 | 0.48 | 0.61 | 0.48 | 0.13 | 0.28 | 0.16 |
| White | 0 | 1 | 0.13 | 0.33 | 0.10 | 0.32 | -0.22~ | -0.68 | 0.00 |
| Other race | 0 | 1 | 0.28 | 0.44 | 0.29 | 0.20 | 0.09 | 0.20 | 0.31 |
| Receives FRPL | 0 | 1 | 0.80 | 0.40 | 0.80 | 0.77 | 0.03 | 0.08 | 0.70 |
| Either parent has a BA degree | 0 | 1 | 0.47 | 0.46 | 0.48 | 0.35 | 0.13 | 0.28 | 0.16 |
| ***Self-reported student attitudes*** | | | | | | | | | |
| Self-efficacy | 1 | 5 | 3.93 | 0.66 | 3.92 | 3.99 | -0.1 | -0.11 | 0.59 |
| Growth mindset | 1 | 4 | 2.07 | 0.74 | 2.08 | 1.98 | 0.14 | 0.14 | 0.48 |
| Goal orientation | 1 | 5 | 3.92 | 0.67 | 3.93 | 3.87 | 0.07 | 0.08 | 0.70 |
| Perseverance | 1 | 5 | 3.76 | 0.80 | 3.77 | 3.70 | 0.09 | 0.09 | 0.64 |
| Adult support | 1 | 4 | 3.44 | 0.70 | 3.43 | 3.49 | -0.09 | -0.09 | 0.34 |
| Sample size | | | 249 | | 220 | 29 | | | |
| *F*-test for joint significance | 0.66 | | *p*-value from *F*-test | 0.75 | | | | | |

**Panel B. Analytic sample with survey responses available**

| | Min | Max | Overall mean/prop. | SD | Treatment group mean/prop. | Comparison group mean/prop. | Difference | Effect size of diff. | *p*-value of diff. |
|---|---|---|---|---|---|---|---|---|---|
| ***Student characteristics*** | | | | | | | | | |
| Female | 0 | 1 | 0.47 | 0.45 | 0.48 | 0.45 | 0.03 | 0.08 | 0.49 |
| Black | 0 | 1 | 0.60 | 0.43 | 0.68 | 0.49 | 0.18 | 0.42 | 0.00 |
| White | 0 | 1 | 0.16 | 0.33 | 0.12 | 0.21 | -0.08 | -0.25 | 0.02 |
| Other race | 0 | 1 | 0.24 | 0.38 | 0.20 | 0.30 | -0.10 | -0.26 | 0.02 |
| Receives FRPL | 0 | 1 | 0.75 | 0.40 | 0.75 | 0.73 | 0.02 | 0.06 | 0.61 |
| Either parent has a BA degree | 0 | 1 | 0.44 | 0.41 | 0.46 | 0.40 | 0.07 | 0.16 | 0.15 |
| ***Self-reported student attitudes*** | | | | | | | | | |
| Self-efficacy | 1 | 5 | 3.80 | 0.72 | 3.83 | 3.75 | 0.08 | 0.12 | 0.34 |
| Growth mindset | 1 | 4 | 2.20 | 0.71 | 2.25 | 2.11 | 0.17 | 0.19 | 0.12 |
| Goal orientation | 1 | 5 | 3.72 | 0.75 | 3.76 | 3.64 | 0.09 | 0.16 | 0.20 |
| Perseverance | 1 | 5 | 3.54 | 0.83 | 3.60 | 3.44 | 0.12 | 0.20 | 0.12 |
| Adult support | 1 | 4 | 3.43 | 0.72 | 3.42 | 3.44 | -0.02 | -0.02 | 0.93 |
| Sample size | | | 329 | | 188 | 141 | | | |
| *F*-test for joint significance | 4.01 | | *p*-value from *F*-test | 0.013 | | | | | |

Notes: Table displays summary statistics (min, max, mean/proportion, and standard deviation) of student characteristics and pre-survey measures assessed at baseline for the entire sample and for Winning Futures participants and comparison group students separately. Results of analyses to assess baseline balance across treatment statuses are also displayed. Balance was assessed in terms of each covariate individually, as well as all covariates jointly.

Table 3.2 Impact of Winning Futures program on academic performance and self-reported attitudes

| Dependent variable: | Semester 1 GPA | Self-efficacy | Growth mindset | Goal orientation | Perseverance | Adult support |
|---|---|---|---|---|---|---|
| WF program effect | 0.28 | 0.34** | 0.05 | -0.05 | 0.26 | -0.01 |
| | (0.21) | (0.12) | (0.21) | (0.16) | (0.16) | (0.14) |
| Comparison unstd. mean | 2.05 | 3.87 | 2.14 | 3.83 | 3.68 | 3.44 |
| Comparison unstd. SD | 0.88 | 0.53 | 0.66 | 0.70 | 0.80 | 0.60 |
| Observations | 329 | 240 | 240 | 240 | 240 | 240 |
| R-squared | 0.14 | 0.16 | 0.40 | 0.32 | 0.22 | 0.21 |

Notes: Table displays the results of OLS regressions estimating the effect of WF participation on students' Semester 1 GPA and self-reported attitudes. Robust standard errors, clustered within classrooms, are displayed in parentheses. Control variables included: school fixed-effects, gender, race, free or reduced-price lunch status, parent education, and an indicator for any imputed variables. Models estimating impacts on survey outcomes also control for a baseline measure of the outcome. For observations where baseline values were missing, overall item mean imputed. Estimated impacts on GPA reported in original units (scale 1-4; e.g., a student who earns a B-average has a GPA=3.0). Estimated impacts on self-reported survey measures reported in effect sizes (outcomes standardized to the comparison group mean and SD). Unstandardized comparison group mean and SD displayed.
*** p<0.001, ** p<0.01, * p<0.05, ~ p<0.1

Table 3.3 Predictors of higher post-survey self-reported attitudes

| Dependent variable | Self-efficacy | | Growth mindset | | Goal orientation | | Perseverance | | Adult support | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (1) | (2) | (1) | (2) | (1) | (2) | (1) | (2) |
| ***Sociodemographic characteristics*** | | | | | | | | | | |
| Female (vs. Male) | 0.11 | -0.05 | -0.05 | 0.04 | 0.09 | -0.07 | 0.06 | -0.06 | -0.05 | -0.16* |
| | (0.09) | (0.09) | (0.10) | (0.11) | (0.08) | (0.09) | (0.10) | (0.10) | (0.07) | (0.08) |
| White (vs. Black) | 0.05 | -0.00 | -0.12 | -0.10 | 0.13 | -0.03 | 0.13 | 0.31~ | 0.22 | 0.29 |
| | (0.20) | (0.18) | (0.22) | (0.31) | (0.21) | (0.31) | (0.16) | (0.16) | (0.14) | (0.18) |
| Other race (vs. Black) | 0.00 | 0.02 | 0.03 | -0.10 | 0.10 | 0.07 | 0.17* | 0.24* | 0.00 | 0.07 |
| | (0.08) | (0.11) | (0.14) | (0.12) | (0.09) | (0.12) | (0.07) | (0.09) | (0.07) | (0.09) |
| Receives FRPL | 0.04 | 0.07 | 0.22 | 0.30 | 0.04 | 0.11 | 0.12 | 0.21 | -0.10 | 0.03 |
| | (0.13) | (0.13) | (0.22) | (0.24) | (0.12) | (0.11) | (0.12) | (0.13) | (0.07) | (0.11) |
| Parent(s) have a BA degree | 0.11* | 0.12 | 0.16~ | 0.12 | 0.04 | 0.05 | -0.05 | 0.02 | -0.04 | -0.04 |
| | (0.05) | (0.07) | (0.09) | (0.11) | (0.07) | (0.10) | (0.10) | (0.13) | (0.07) | (0.08) |
| ***Postsecondary education plans*** | | | | | | | | | | |
| Baseline: Expect to earn a BA or higher | -0.03 | -0.13 | 0.12 | 0.20 | -0.07 | -0.22~ | -0.02 | -0.29 | -0.24~ | -0.26~ |
| | (0.10) | (0.11) | (0.14) | (0.15) | (0.11) | (0.10) | (0.13) | (0.17) | (0.13) | (0.13) |
| Baseline: Plan to enroll immediately after HS | -0.11 | -0.11 | -0.04 | -0.05 | -0.03 | 0.10 | 0.07 | 0.19 | -0.02 | 0.04 |
| | (0.09) | (0.12) | (0.08) | (0.12) | (0.07) | (0.11) | (0.09) | (0.14) | (0.07) | (0.09) |
| ***Mentoring program experience and relationships quality*** | | | | | | | | | | |
| Baseline interest in WF | 0.10~ | 0.08 | -0.05 | -0.11 | 0.12~ | 0.12 | 0.05 | 0.02 | 0.03 | -0.00 |
| | (0.05) | (0.06) | (0.07) | (0.11) | (0.06) | (0.07) | (0.09) | (0.11) | (0.07) | (0.07) |
| Student-mentor race match | -0.08 | 0.01 | 0.01 | -0.02 | -0.11 | -0.07 | -0.10 | -0.02 | -0.01 | -0.02 |
| | (0.10) | (0.07) | (0.10) | (0.11) | (0.09) | (0.10) | (0.10) | (0.11) | (0.09) | (0.08) |
| Student-mentor relational quality | 0.37*** | 0.22 | -0.04 | -0.18 | 0.28*** | 0.18 | 0.34*** | 0.27 | 0.18** | 0.21~ |
| | (0.07) | (0.16) | (0.09) | (0.15) | (0.07) | (0.16) | (0.08) | (0.18) | (0.06) | (0.11) |
| Student-mentor instrumental quality | 0.32*** | 0.16 | 0.01 | 0.15 | 0.24** | 0.07 | 0.29*** | 0.10 | 0.17** | 0.08 |
| | (0.07) | (0.14) | (0.07) | (0.14) | (0.07) | (0.14) | (0.07) | (0.17) | (0.05) | (0.10) |

| Dependent variable | Self-efficacy | | Growth mindset | | Goal orientation | | Perseverance | | Adult support | |
|---|---|---|---|---|---|---|---|---|---|---|
| Pre-survey measure | Varies | 0.26* | Varies | 0.60*** | Varies | 0.57*** | Varies | 0.31** | Varies | 0.21* |
| | Varies | (0.12) | Varies | (0.06) | Varies | (0.10) | Varies | (0.09) | Varies | (0.10) |
| Constant | Varies | 1.89*** | Varies | 1.18** | Varies | 0.74* | Varies | 1.42** | Varies | 2.12*** |
| | Varies | (0.43) | Varies | (0.34) | Varies | (0.28) | Varies | (0.38) | Varies | (0.25) |
| School FE | x | x | x | x | x | x | x | x | x | x |
| SE clustered w/in classrooms | x | x | x | x | x | x | x | x | x | x |
| Observations | Varies | 162 | Varies | 162 | Varies | 162 | Varies | 162 | Varies | 162 |
| R-squared | Varies | 0.34 | Varies | 0.47 | Varies | 0.43 | Varies | 0.33 | Varies | 0.26 |

Notes: Table reports the association between students' self-reported attitudes (self-efficacy, growth mindset, goal orientation, and perseverance) and students' background characteristics, post-secondary education plans (baseline), and mentoring program interest and relationships. Robust standard errors, clustered at the classroom-level, are displayed in parentheses. Each row in column (1) displays results from a model in which the predictor variable predicts the outcome on its own (i.e., each row represents the result from a separate regression). Column (2) shows the results from a models with all predictor variables entered together. Analyses used non-imputed versions of outcomes variables in their original (non-standardized) units. *** p<0.001, ** p<0.01, * p<0.05, ~ p<0.1

## Chapter 4

## Career Mentoring as an Approach to Enhancing College Readiness: A Social Validity Evaluation of the Winning Futures Program

Past studies link youths' participation in career development programs to a number of positive outcomes such as increased wages, improved school-related attitudes, and reductions in high school dropout (Dougherty, 2018; Kemple & Willner, 2008; Perry et al., 2018; Plank et al., 2008; Plasman, 2018). The evidence of effects related to postsecondary education, however, is mixed. Some studies find effects for certain groups of students but not for others (Brunner, Dougherty, & Ross, 2019; Hemelt, Lenard, & Paeplow, 2019); meanwhile other studies conclude that participation in career interventions is not associated with better (or worse) academic outcomes (Cellini, 2006; Kemple, 2001; Kreisman & Stange, 2018).

Given their demonstrated benefits, career interventions are frequently framed as effective means of engaging students in school and enhancing their readiness for "employment and educational outcomes" (DeLuca et al., 2006; Perry & Wallace, 2012). What research on career interventions often neglects, however, is an exploration of the mechanisms through which such opportunities operate. Without this insight, it is difficult to know which aspects of career development programs are the key ingredients. In particular, if career interventions have the potential to improve postsecondary educational prospects, these mechanisms must be understood.

This manuscript explores participants' perspectives within a career mentoring program. Specifically, the qualitative study evaluated the Winning Futures program, a school-based mentoring intervention. The goal of the Winning Futures program is to enhance participants' college and career readiness, equipping students with workplace- and college-relevant skills as well as a clear roadmap to their post-high school plans. During the 2019-2020 school year, students at seven high schools across the Metro Detroit region participated in the Winning Futures program. Participating students engaged weekly with an adult mentor within their field of career interest. During their mentoring sessions, mentors supported students as they engaged in conventional career exploration activities (e.g., a career aptitude survey, use of online career exploration software, writing a post-high school educational and occupational plan).

Social Cognitive Career Theory provides a framework for exploring the outcomes of career mentoring. Within this model, Winning Futures' two main components – mentoring and career exploration – may each contribute to students' development of career interests and goal-directed behaviors, and they may be especially effective in concert. The combination of mentoring and career exploration offered by Winning Futures made the program an ideal site for this study because it enabled an exploration of how these two aspects of a career development intervention might operate together.

As the results of this study show, career mentoring has the potential to enhance students' readiness for college, however the success of these interventions hinges on the formation of strong mentoring relationships. Given the significant investment of time and effort required to establish strong mentoring bonds, career mentoring is unlikely a scalable approach to school-based career development. That said, certain aspects of career mentoring may have broad applicability. As just one example, middle and high schools commonly use online career exploration software to help students craft their post-high school educational and occupational plans (Hooley et al., 2011). The current study shows that engaging with such software alongside a mentor or coach who has knowledge of students' strengths can help to personalize students' searches, resulting in more meaningful and better-developed plans.

## Background

### Enhancing college readiness via career mentoring: Social Cognitive Career Theory

Social Cognitive Career Theory (SCCT) depicts how young people form career aspirations and take initial steps on their postsecondary education and career pathways (Lent et al., 1994). Many studies of career interventions employ SCCT as a conceptual framework (Sheu et al., 2010). The model has also been proposed as a useful lens to view the barriers to college access for minoritized students (Gonzalez, 2015). As its authors note, although SCCT appears to foreground careers (and for brevity, only the term "career" is used), young people's choices about post-high school education and occupational preparation are inherently linked, and thus, the model can be used to understand preparation for college as well as careers.

Three main concepts, depicted in Figure 4.1, are central to SCCT: self-efficacy, outcome expectations, and goals. Self-efficacy refers to individuals' beliefs about their ability to organize and complete the steps necessary to achieve their desired level of performance (Bandura, 1986). Outcome expectations refer to personal beliefs about probable outcomes in response to one's actions. Whereas self-efficacy beliefs concern an individual's capabilities (i.e., "I can do this"),

outcome expectations concern the imagined consequences of performing particular behaviors (i.e., "if I do this, what will happen?"). Finally, goals play an important role in the self-regulation of behavior by helping individuals to organize and guide behavior and sustain it over long periods of time, even in the absence of reinforcement (Bandura, 1986). In these ways, goals work to increase the likelihood of desired outcomes.

Personal and contextual factors also play a key role within SCCT. Person inputs include an individual's mindsets and dispositions, as well as social identities, such as gender, race, disability, and social class. Contextual or background features include the social, physical, and cultural aspects of the individual's environment. One way that career mentoring, like the WF program, may enter the SCCT is as a contextual influence. Personal and contextual factors operate in the model at three points: as precursors to the socio-cognitive components (self-efficacy, outcome expectations, and interests); moderators of proposed linkages within the SCCT model; and direct facilitators or deterrents (e.g., availability of career mentoring).

The SCCT model encompasses both how individuals form career interests and educational goals (left side of the diagram in Figure 4.1) and their behaviors in pursuit of goals (to the right). At the heart of the SCCT model, social learning experiences link these two processes. Learning experiences are the context in which individuals generate meaning about the givens of their situations and start to form beliefs and expectations about the feasibility of a particular task. The SCCT model acknowledges that learning experiences are social in that personal and contextual background impact both the opportunities available to individuals, and their experiences within them. For instance, a female high schooler may observe the achievement of her career mentor (a female engineer), and decide to invest in future education to achieve her own STEM-career goals. Alternatively or in the absence of a mentor, she might internalize the message that women do not pursue STEM-related jobs, which would be a negative learning experience as a result of lack of role models or discriminatory statements.

Using the SCCT model as a framework, career mentoring seems a promising strategy for enhancing college readiness through multiple avenues. First, career mentoring activities can facilitate the formation of career interests and goals. This might occur as students observe their mentors as role models, experience mentors' support and encouragement, research different career pathways, and identify the requisite education and training to achieve their post-high school objectives. Second, career mentoring programs can be viewed as a contextual influence. According to SCCT, these can contribute to choice goals and choice actions, and may also moderate the proposed

linkages between career interests, goals, and actions. For example, mentored students may set goals that more closely align with their intended career pathways. With a mentors' support, students may be more able to persist towards or perform well in their short-term goals, including their high school coursework – a prerequisite for college.

**Defining college readiness**

Traditionally, measures of readiness for college have focused on key indicators of academic performance, including high school grade-point average and admissions test scores (Porter & Polikoff, 2012). Scholars and policymakers alike, however, recognize that successfully enrolling and succeeding in postsecondary education requires more than simply the mastery of core academic content knowledge (Duncheon, 2015). "College-ready" students are prepared to enter postsecondary education without the need for remediation and to navigate the system to obtain a degree (Conley, 2012; Page & Scott-Clayton, 2016; Roderick et al., 2009). Although exact terms differ, various conceptualizations of college readiness acknowledge that achieving these outcomes requires skills and knowledge across at least three domains: cognitive academic factors, non-cognitive factors, and navigational or transitional factors.

Cognitive academic factors include the content knowledge and academic skills demanded by entry-level college coursework (Conley, 2012; McAlister & Mevs, 2012), commonly assessed by high school grade-point averages, aptitude scores, or completion of core academic courses such as "college preparatory" math classes (M. C. Long et al., 2009; Porter & Polikoff, 2012). In addition, readiness for college extends beyond academic factors and includes attitudes, mindsets, and behaviors, a set of competencies sometimes referred to as "non-cognitive" factors (Farrington et al., 2012). Commonly-cited capabilities include positive self-concepts – such as self-efficacy, self-esteem, growth mindset – and productive self-management or student ownership of learning – for example, persistence, goal setting, time management (Conley, 2012; Connect Ed California, 2012). Navigational or transitional factors, sometimes called "college knowledge," refers to the skills and knowledge students need to adapt to postsecondary settings (Conley, 2012; Roderick et al., 2009). These competencies, which can also be framed as non-cognitive, help students to navigate complex admissions and financial aid processes and develop an understanding of college norms and cultures.

Career interventions, like the one under study here, may relate to each of the aspects of college readiness – cognitive academic, non-cognitive, and navigational. However, whether and how they actually enhance college readiness remains under-explored, gaps which this study helps to fill.

### Social validity

This manuscript presents the results of a subjective evaluation of a career mentoring program. This study was conducted alongside a quantitative evaluation of the program (see Chapter 3 for a description of the randomized experiment). The qualitative component of the evaluation used a social validity framework to assess participants' perspectives on the program.

Social validity refers to the perceived social importance of an intervention or treatment from the perspective of the individuals who participated in it (Wolf, 1978). Social validity assessments originate from the field of behavioral analysis and Montrose Wolf's seminar article in the *Journal of Applied Behavior Analysis*. There, Wolf outlined three dimensions of interventions which warrant consideration: (1) the social significance of intervention goals, (2) the feasibility of intervention procedures, and (3) the social importance of intervention effects. The most frequent method for determining the social importance of a given intervention or procedure has been to ask those receiving or implementing it about their opinions (Carter, 2010).

Qualitative social validity data can be collected and analyzed alongside quantitative measures to conduct a subjective evaluation of an intervention (Carter, 2010). Researchers have applied such an approach in educational settings in studies evaluating student support interventions to explore students' and educators' perspectives on the importance of the programs' effects and the appropriateness of the intervention procedures (Cleary, 2021; Gershenfeld, 2014). A social validity perspective helped to frame this study's focus on the perceived benefits of career mentoring and the aspects of the program (i.e., mechanisms) that were integral to its success.

### Current study

The purposes of this study were to explore whether and how career mentoring can enhance participants' college readiness, and if so, to understand which components of career mentoring programs are central to their effectiveness. Using a social validity framework, three specific research questions guided the investigation:

1. What did participants perceive as the benefits students received from participating in Winning Futures?
2. How did two key program components – mentoring and career exploration curriculum – support students?
3. What barriers prevented greater student support?

## Methods

### Research context: Winning Future career mentoring program

Winning Futures (WF) is a school-based workforce prep and mentoring program. High school teachers partnering with the organization give up instructional time in order to embed the program into students' regular school day. Mentoring sessions follow a structured career exploration and goal setting curriculum. Students participate alongside their assigned mentors, adult volunteers from the local professional community near their school.

Over the course of the year, student participants attend 21 weekly sessions. WF sessions are designed to help students build relationships with their mentors, explore information about various career pathways, establish concrete plans towards their personal career goals, and practice workplace etiquette and skills. The sessions are led by a WF facilitator who leads the group of students and mentors in career-focused curriculum.

Mentoring teams, typically one mentor with three students, spend significant time during WF sessions getting to know one another and sharing about students' day-to-day lives. About half of the sessions are mentor "free" days, meaning that mentors are free to select activities that would engage their assigned mentees; mentors choose activities based on the students' interests. In addition to building relationships during class sessions, WF leaders encourage mentors to communicate with their mentees outside of school via text message, email, and phone.

WF representatives conduct a careful search and interview process to select the individuals who volunteer as mentors. All mentors are invited to multiple training sessions throughout the year and new mentors are required to attend. Each mentor is typically matched with three students, a process that WF representatives also dedicate great care to. WF leaders use students' pre-survey responses to match them with a mentor: pairs are matched first by gender and next by career and other personal interests (e.g., girls interested in STEM are matched with women engineers).

**Participants**

WF classroom facilitators helped to recruit several groups of participants to share their perspectives in this subjective evaluation of the WF program. Table 4.1 describes the background characteristics of the students, mentors, and teachers who participated in the study.

**Students.** The students who participated in the study included a subsample of those who participated in the randomized experiment evaluating the WF program (see Chapter 3). All of the WF students at four schools received email and text-message invitations to participate in the qualitative evaluation. Classroom facilitators shared an announcement about the study and invited student participation during an online mentoring session. In addition to these invitations that all students received, WF program leaders helped to recruit a "purposeful sample" of students

(Seidman, 2006) by reaching out individually to encourage students they believed would contribute different perspectives (e.g., students who were both more and less engaged in the program). Student participants received a small monetary incentive ($10 online gift card) in exchange for their time. Of the seven students who participated, six identified as girls and one as a boy; five identified as Black and two as White; all of the students were in 10th-grade.

**Mentors.** Mentors were recruited from the same schools as the student study participants. All of the mentors participating in WF at these four schools received emails inviting them to attend a focus group. WF leaders reviewed the lists of mentors who signed-up to attend and confirmed that the group included mentors with different experience levels and individuals who they anticipated would share multiple perspectives on the program. Of the 13 mentors who participated, six identified as women, and seven as men; four identified as Black, and nine as White; mentors' experience levels ranged from 1-10 years.

**Teachers.** WF partners with high school classroom teachers. The teachers whose students participated in WF at four schools were invited to participate in the qualitative evaluation of the program. WF program leaders sent an email message inviting teachers to sign-up for an interview; participating teachers were offered a monetary incentive ($25 gift card). Of the five teachers who participated in interviews, three identified as women, and two as men; two identified as Black, and three as White; teachers taught a range of subjects areas including English, social studies, science, and student support classes.

**Data sources**

In total, fifteen qualitative data sources shed light on participants' perceptions of the WF program: four student focus groups, six mentor focus groups, and five classroom teacher interviews. All focus groups and interviews took place using the Zoom video chat application. The conversations were all recorded with the participants' permission. Afterwards, the recordings were transcribed verbatim. During transcription, the names of schools and study participants were replaced with pseudonyms to protect individuals' identities. When participants referred to people who were not participating in the qualitative study (e.g., students who talked about mentors that did not attend a focus group), I replaced those references with generic phrases like "my mentor." Immediately following each focus group and interview, I reflected on the conversation and took notes related to the study's guiding questions. These reflective memos provided a starting point for future data analysis.

**Student focus groups.** Each student attended one focus group of about 30-45 minutes with one or two other students from their school. I opted to conduct focus groups, instead of individual interviews, because I believed a discussion with their peers would feel more comfortable and be more generative than a one-on-one conversation with an outside adult (i.e., myself). To further increase students' comfort-level, a classroom assistant from the WF program also attended the focus groups. My discussions with students focused on how WF impacted them in terms of their performance in high school and their future career objectives. I asked specifically about the role that mentors and the WF curriculum played in effecting the outcomes students described. Although not the main focus, I asked about students' engagement with the WF program and their mentors since the start of virtual mentoring due to the pandemic. Finally, students shared how, if at all, they wished the program could change to better serve students.

**Mentor focus groups.** Each mentor participated in one focus group of about 60 minutes along with one or two other mentors. No WF staff members attended these sessions. Mentor focus groups were organized by school, but often included mentors from different classrooms. The discussions focused on what mentors saw as the greatest impacts of WF on students, and whether and how mentoring and the career exploration curriculum played a role in achieving the outcomes they observed. Mentors reflected on the program as a whole and their experiences during the pandemic specifically. Finally, mentors shared feedback about how the program could be improved to better serve students.

**Classroom teacher interviews.** Each teacher participated in one 60 minute interview. Since teachers at different schools could have quite different experiences with WF, I opted to interview each teacher on their own. The discussions focused on the impacts of WF teachers observed, and whether and how either mentoring or career exploration contributed. Teachers reflected on differences they observed between their WF and non-WF classes and the extent to which they could attribute those differences to the WF program. Finally, teachers identified barriers to greater program impacts and offered feedback about how the program could improve.

**Coding and analysis**

The data for this study included fifteen transcripts from focus groups and interviews. I stored and analyzed all data in the qualitative software program Dedoose. Before coding, I broke the text into idea units – excerpts that each contained one distinct idea, a process that Seidman (2013, p. 120) described as "marking what is of interest in the text." These excerpts became the unit for qualitative analysis. Two stages of closed- and open-coding followed (Charmaz, 2006). First, I read

all data sources once and grouped the excerpts under four overarching clusters that I identified in advance and which aligned with the research questions: perceived benefits, mentors, career exploration, and barriers. Excerpts related to multiple clusters were multiple coded initially, and eventually I created a new code including excerpts related to both mentoring and career exploration: "synergies of career exploration in the context of mentoring relationships."

After initially grouping excerpts under the main clusters, I conducted several rounds of inductive coding, focusing on one cluster at a time. Themes emerged representing the ways participants viewed the benefits, each of the main mechanisms, and the barriers. Throughout this iterative process, I drafted a codebook with descriptive definitions of each code and one example excerpt from a student, mentor, and teacher for each one.

The final codebook contained 12 codes. The "Perceived benefits" cluster contained the following four codes: Non-cognitive competencies; Future planning; Academics; and No impacts. Two codes related to "Mentoring" included: Consistent presence and advocacy; and Communication and accountability. The two "career exploration codes" included: Forming and honing interests and plans; and Practicing professional skills. Two codes under "Synergy of mentoring and career exploration" included: Mentors as role models; and Personalized navigation. Finally, two codes related to "Barriers" were: Lack of mentoring bond; and Lack of time. Table 4.2 presents the final set of codes applied under each cluster and illustrative examples of the excerpts associated with each.

I worked with a colleague to assess the reliability of my code application. Using the final codebook which I developed, my colleague independently coded a sample of data sources (two student transcripts, two mentor transcripts, and one teacher interview transcript). Measures of inter-rater reliability indicated a substantial reliability in our application of code clusters (Cohen's Kappa = 0.7135, percent agreement = 80%), and a moderate level of agreement at the level of sub-codes (Cohen's Kappa = 0.6034, percent agreement = 63%). My rationale in collaborating with an outsider reader at this point was to ensure that I had articulated definitions and decision rules that could be understood by others and that I was applying the codes consistently. A possible threat to the validity of my findings, however, was the lack of peer review of the initial codebook. Since I developed the initial codes without input from others, I may have overlooked themes in the data and my personal biases may have influenced the codes I developed. The relatively high degree of agreement in our code application, however, improves the validity of the coding processes.

After coding all data sources, I composed memos summarizing the central themes that emerged related to the study's guiding questions. Quotes from students, mentors, and teachers were integrated throughout to illustrate the themes using participants' own words. I shared a draft of my memos with WF leaders and we met to discuss my initial findings. Although they recommended revisions related to a few smaller details, they agreed with the clusters and themes that I identified. They also shared that my findings resonated with their own views of the WF program. WF staff expressed sincere appreciation for the feedback about how their organization could improve. In light of the overall positive feedback I received, I moved forward with composing final versions of my analytic memos. These drafts became the basis of the study's main findings.

**Validity**

Maxwell (2013) notes two main threats to validity – researcher bias and reactivity – and I am mindful of both. My personal lenses and background could have influenced how and what I saw in the data. In particular, over the course of the study, I developed strong relationships with several WF leaders. My investment in the program and belief in its value may have caused me to overlook the organization's limitations. I am also mindful of how my social identities could have influenced my interactions with study participants. I was thoughtful of how my role as a researcher might make participants might feel they needed to perform or impress me, or feel uneasy sharing their honest opinions about their experiences with WF. At the start of each focus group and interview, I reassured participants that both WF and I were genuinely interested in their honest feedback about both the benefits of WF and how to improve the organization. The fact that most participants, mentors and teachers especially, were forthright in sharing ideas about the program's limitations and areas for growth speaks to the validity of my findings. I believe my background as an intervention teacher helped build common ground with teachers and mentors. While several of my social identities – White, female, upper-middle class, and college educated – matched that of many mentors and teachers, these same traits set me apart from many students. I always kept these differences in mind as I worked to establish rapport at the start of focus groups. I also invited a WF classroom facilitator to join me in my conversations with students with the hope that seeing a familiar face would put them at ease.

My research design attends to validity in a few key ways. First, I met with WF leaders regularly (about once every other week) over the duration of the study. I also visited WF classrooms several times for informal observations. These meetings and observations gave me a chance to build relationships with WF staff and gain an in-depth understanding of how things worked within the

organization. I collected data from multiple groups of participants – students, mentors, and teachers – which allowed me to "triangulate" my findings (Maxwell, 2013). By collaborating with a colleague on the application of codes, I tried to ensure that my own interpretations were more justified and could be understood and applied by someone less familiar with the data. Finally, I attended to validity by "member checking" my findings by inviting input from WF leaders. I shared initial drafts of my findings with the WF Director of Programs, my main research partner in the project, with whom I met multiple times to discuss his feedback. I also shared a draft report with the program's CEO, who provided her input during a meeting. Although each WF leader clarified minor points, they agreed with my overall finding and shared that the results validated their own views of the WF program. In particular, they were appreciative of the feedback on how the organization could better serve students. Following these meetings, I addressed my research partners' suggestions by adding contextual information to clarify several participant quotes. I believe that the changes I made in response to these stakeholders' input, and their overall agreement with my results, strengthened the validity of my findings.

## Results

### Perceived benefits of career mentoring

The results of this qualitative study, and its quantitative companion, showed that students benefit from career mentoring in ways related to college readiness. Quantitative analyses provided suggestive evidence that the program improved students' academic performance and non-cognitive college-ready competencies (see Chapter 3 for findings of small, positive impacts on students' grades and attitudes). The qualitative evaluation identified several ways that students benefited from WF participation.

**Improvements in non-cognitive college-ready competencies**. Mentors, students, and teachers each described non-cognitive, or attitudinal, improvements as the most significant benefit students gained from the WF program. This included a wide range of changes such as, improved academic focus and motivation; stronger interpersonal skills; and increased personal confidence, maturity, and independence. One student described the overall changes in her attitudes this way:

> Become a better woman. Become a better person. Change my attitude. [Winning Futures] gave us tips on how to take care of yourself. My mentor helped my overall mindset to change, to mature over time. Because I had a very childish mindset and my mentor told me, "You have to change if you want to do this." I'm like, "Yes, you're right," and I have to take the responsibility and shift my mindset. (Jayla, Student focus group)

Students reported gaining academic motivation and focus from WF. They said that because of the program they had "increased focus," felt "more serious," and experienced a "push" from their mentor and the program to improve and persevere through difficulties. Even students who were already earning high grades before WF said that their attitude towards school improved: "[My mentor] gave me the motivation to not just accept an A minus and just say, 'No, you always wanted an A plus, so stick to trying to get an A plus'" (Chantelle, Student focus group). Students said that WF gave them tools and motivation to focus, especially as they started taking upper-level courses later in high school.

Teachers also observed the improvements in students' motivation and focus. Comparing the growth in attitudes of her WF students (a regular level class) to the attitudes of another, non-participating group (an honors class), Ms. Nolan said that her WF students had become, "more focused than my other classes that didn't participate in Winning Futures." She described her WF students as "more accountable" and "better students" and said she wished her honors class could have participated because, "They really need it" (Ms. Nolan, Teacher interview).

In addition to increased motivation, students and mentors reported that students also gained other college-ready attitudes like teamwork. For example, one mentor described this change in a student saying that, "she really achieved understanding how you have to work with others…Because she's so independent, I saw that progress in her working as a group during our time together" (Kathryn, Mentor focus group). Participants attributed this growth to several team-based activities that they completed with their mentor groups.

Other college-ready skills students gained included: communication, professionalism, leadership, and creativity. Ms. Nolan said that her WF students' email etiquette exceeded that of students from other classes and she wished that all her students had the same opportunities to practice that skill. Mentors and teachers frequently highlighted leadership as a skill that students gained. One mentor described the growth in leadership he observed in one of his mentees:

> Individually, [this student], became kind of the leader of the group, so to speak. And he took the lead on standing up and talking for the group or things of that nature. I saw him grow in that aspect. He was very shy at the beginning in terms of volunteering and things like that, so I really saw him grow. (Jeremiah, Mentor focus group)

Students saw themselves developing communication and self-presentation skills like speaking with adults and giving a firm handshake as a result of WF. Several said that WF taught them to present themselves professionally – smiling, making eye contact, having a positive attitude –

even when doing so pushed them out of their comfort zone. As one student recalled: "Well, I liked how Winning Futures has taught me to give eye contact, because I don't really like giving people eye contact, it just makes me nervous" (Chantelle, Student focus group).

Finally, participants said that students ended WF with greater self-confidence and a more positive outlook on their long-term future goals. Increased confidence was a common theme across all study participants. Teachers and mentors highlighted students' future plans as one area in particular where students gained confidence. For example, Ms. Nolan noted, "One of the things that I love about Winning Futures is, even if [students] don't grow academically, I see the maturity in the thought process towards their future." Describing how students benefited from the curriculum, one mentor said that students gained, "the confidence to start going out there and actually accomplishing some of these goals" (Nicole, Mentor focus group). Another said that WF gave students the confidence to say to themselves, "Okay, I can get excited about my future, and I can get excited about school" (David, Mentor focus group).

**Development of career interests and post-high school plans.** After attitudinal growth, developing career interests and plans was the next most commonly reported benefit of career mentoring. Several mentors and teachers in particular saw this as the main impact of the WF program, describing these changes as, "the main takeaway" and something that "really resonated" with students. One teacher said, "the largest impact [of WF] is the career choice" (Ms. Smith, Teacher interview).

Students also saw changes in their future plans as a key way that WF impacted them. Some said that WF helped them to identify career goals and begin planning towards them. For instance, one student noted that, "When I think about what I wanted to do in the future, …[WF] opened my mind to thinking about more things I should be considering" (Chantelle, Student focus group). Students appreciated learning about salaries and required education and training from the career search activities. Many described the value of the long-term planning activities WF facilitated. As one student described them:

> We did steps, we had to write our career on top, and then we had to put how we're going to get there. That really helped and I took a picture of [the worksheet], and I'm going to make sure I hit every target, so I can get exactly where I want to be. And they gave me a time limit for short-term, long-term goals, so I'm just making sure I keep on track so I can achieve my goals. (Aaliyah, Student focus group)

Some students said that they began WF with a predetermined career aspiration, but that WF helped them refine or better visualize their goal. For example, students narrowed their ideas about college majors or particular programs to enroll in. Hearing mentors share their professional stories concretized students' ideas about their future plans. As one student described, "[WF] was a great experience for me because it connected to what I want to do when I get older. My mentor was in healthcare, and I want to be a nurse. So it gave me an insight on what's to come" (Jayla, Student focus group). Another student who plans to pursue an artistic career said that speaking with her mentor, a graphic designer, helped her see that, "I can't just draw something and give it away…I have to put my gift into something. I'll probably work, let's just say, for billboards, or working with the police as a forensic artist, trying to fight criminals" (Chantelle, Student focus group).

Although less common, some attributed concrete steps students took towards career and educational paths to WF participation. One student, for example, completed her drivers' education training in order to attend an art program across town. The student's mentor, Nicole, said that checking-in each week provided the accountability necessary to motivate the student to get her license. As another example, Chantelle said that WF impacted her plans for elective courses in high school: rather than taking band as an 11th-grader, she had enrolled in an art class in pursuit of her goal of becoming a forensic artist.

**Improved academic performance.** Academic improvements were another area of growth that students, mentors, and teachers attributed to WF participation, although academics received somewhat less attention and some participants reported no academic changes as a result of WF.

Several students credited their improved grades to their experiences in WF. As one student said, "[WF] pushed me to get higher grades, push that B to an A. So, doing that extra push. They wanted me to push to do better. Take that extra step" (Jayla, Student focus group). Several students said that support and "push" from their mentors helped them improve their grades. As one said, "If I didn't have a mentor, I would have okay grades, not the best, but I wouldn't have it over the top, just pushing, pushing, pushing. I needed someone to push me more. The mentor gave me that extra push that I needed" (Kaylen, Student focus group).

Several teachers believed students grew in their study habits because of WF. Ms. Smith noted that as the program progressed, "students started turning in things more on time, they started being more responsible, were getting to the classes, not only to Winning Futures but to their regular classrooms, on time" (Ms. Smith, Teacher interview). Ms. Rivers described the growth in her WF class:

> [My WF class] started out academically as a class I had to push a little bit more. And then as the year went on, a lot of my students in [that class], really, I don't know, somehow something clicked and they started doing better and getting better grades, trying harder than they were at first. So I did. I did see that as a positive. (Ms. Rivers, Teacher interview)

Teachers said that the accountability for grades that WF provided helped students to improve. Students and mentors both viewed the regular grade check-ins that WF facilitated as key to the academic improvements that occurred. They also observed mentors teaching study skills and helping students with homework assignments.

In addition to higher grades, teachers also credited improvements in students' attendance to WF. Ms. Smith, a college advisor and teacher, observed that not only were students more punctual and consistent in their attendance to the WF sessions, they also improved attendance in other classes as well. Multiple students noted that WF improved their desire to attend school. For example, one said, "…[WF] is really the main reason why I would come to school on a Wednesday" (Destiny, Student focus group).

**No impacts.** Although most study participants saw WF as beneficial, some also shared instances when the program did not result in visible changes. Academically, one teacher, Mr. Miller, said he saw no differences in grades. He said: "When I look at the grade book, the amount of kids failing those classes or doing poorly in those classes are pretty similar to my other classes. So, I don't believe there's a huge academic impact" (Mr. Miller, Teacher interview). He did, however, see merit in the program for other reasons: "I don't believe there's a huge academic impact. I do think there's an impact in life and I think Winning Futures is very influential and very, very important, but I don't know that its impact is immediate, like in the classroom" (Mr. Miller, Teacher interview).

Although the minority, a few students said that WF provided little academic benefit. As one student put it: "I'm a very independent person, so I don't really depend on much. So for me personally, it didn't quite affect anything, but that's purely because I just work by myself" (Sydney, Student focus group). The students who participated in the study were among the most engaged in WF and may have also been higher performing academically. For example, one student said, "I have always been serious about my grades, so I didn't really need that boost to be on my back and tell me get an A plus, because I was always on my own back telling myself that" (Chantelle, Student focus group). It is possible that students who struggled academically may have different views on WF's academic support, but unfortunately a limitation of the study is that lower performing students were underrepresented among study participants.

In addition to a lack of academic impacts, teachers and mentors also noted instances in which WF did not change students' attitudes. Teachers tended to attribute this to their students' apathy towards WF and lack of engagement in the program. Mr. Clark, for example, described his WF class as "challenging" and "hard to reach," leading him to conclude that, "As a whole, I would say there wasn't a whole lot of progress for those kids" (Mr. Clark, Teacher interview). Mentors also tended to attribute lack of attitudinal growth to students' reluctance to fully engage. For instance, one mentor described how two students left the group early on: "[Those two students] were checked out from the time that they walked through the door, and I think within the first couple of weeks, they just left the program. Basically shared with their teacher they weren't interested. They had other things to do, bigger things on their mind" (David, Mentor focus group).

**Perceived mechanism: Mentoring relationships**

When asked how WF supported students, study participants said that mentoring relationships were integral to the program's successes, emphasizing the "connections," "bonds," and "comfort level" established between students and mentors. Teachers recalled the mentoring conversations they observed during WF sessions and cited students' smiles and laughter as evidence that they "enjoyed the interactions" with their mentors. Mentors talked about building deep and strong relationships which they saw evidenced through the "regular communication" patterns they established and by students' willingness to "open up about their lives." Students saw their mentors as "easy to talk to" and adults they trusted who they could confide in. One mentor shared: "One of my girls actually sent me a text just the other day [that said], 'I just feel comfortable opening up to you and knowing that you're not going to spread my info around'" (Amy, Mentor focus group).

**Consistent presence and advocacy.** Reflecting on how mentoring benefited students, study participants described mentors as part of students' support networks, or as some described it, "being there" for students. Many mentors and students shared that "just knowing they have someone" was helpful. Sometimes mentors acted as a safety net for students to access when they needed help. For instance, as one student noted, "I had my ups and downs during the year, and when I needed someone to talk to, [my mentor] was the person I could call or text to help me out" (Kaylen, Student focus group). In some cases, mentors' support appeared passive. Teachers, students, and mentors alike talked about WF mentors as role models, using terms like "mother or father figure" and "big brother or big sister" to explain how mentors' presence supported students. Central to mentors supportive presence was their consistency. Mentors called this "familiarity" and said that meeting at least weekly was important. As one student said, "Just having a welcoming face

[there] every week… Just knowing that she's going to be there with her bright, smiling face every week was really fun" (Sydney, Student focus group).

In some instances, mentors offered concrete help or advocacy on students' behalf. One student, Gabriel, talked about how his mentor helped him with homework and offered to provide a professional or college reference in the future. Teachers shared instances when mentors' advocacy made a significant impact in students' lives. Ms. Smith remembered a "very observant" mentor who brought a student's learning disability to light. She also recalled another mentor who supported a student during a long-term suspension:

> I had three young ladies who were on a long-term suspension and up for expulsion…One student's mentor wrote a letter on her behalf, [after] only knowing her for five weeks. And that spoke volumes to that young lady. During the first Winning Futures meeting after she was allowed back, she walked in that room and just started bawling, and wanted to thank her mentor. She said, "You didn't even know me, you only saw me five times, and yet you had my back." That was extremely powerful. (Ms. Smith, Teacher interview)

**Between-session communication and accountability.** Study participants saw mentors' regular communication outside of in-person WF sessions as a particularly important support. Before the pandemic suspended in-person mentoring, most mentors said they contacted students about once per week. Text messages were the most common method of communication. Virtual communication became particularly essential during the pandemic. Mentors used text messages to keep in touch about students' academics (e.g., upcoming tests, study habits) and their personal lives (e.g., "How is their family doing?"). Many students said they appreciated the "encouraging words" their mentors shared via text message throughout the pandemic months. In some cases, mentors and students continued to correspond even after students completed the WF program. Teachers and mentors both knew of current college students who were still in touch with their mentors, primarily via text message.

Mentoring relationships generally, and virtual communication in particular, benefited students by holding them accountable. As one mentor put it, "Reaching out to my mentees helped them know what they said is on record… Knowing that somebody was checking on them, I felt, helped them grow because then they had to give a response instead of a blow off answer" (Eric, Mentor focus group). Students frequently mentioned how their mentors' academic encouragement and accountability influenced their actions. Aaliyah, for example, said her mentor pushed her to go ask teachers for help. Several participants talked about the impact of mentors' "check-in's." One

mentor recalled how powerful this was for one student: "There was a kid that was crying, saying, 'My dad died when I was eight. I don't really have anybody that checks in on me if I don't show. And my mentor does, and that means the world to me'" (Amy, Mentor focus group).

**Perceived mechanism: Career exploration curriculum**

**Forming and honing interests and plans.** Reflecting on how WF benefited students, participants said that WF's career exploration curriculum exposed students to a variety of career fields and helped them form or hone their post-high school plans. Teachers and mentors said that the WF curriculum oriented students' thinking towards the future by giving them ideas about careers to pursue. For example, one teacher noted, "I liked how the activities, topics, and programming helped the students think outside of where they are right now. I think that's important…Sometimes, they can't see past 10th-grade" (Ms. Rivers, Teacher interview).

Participants identified components of the WF curriculum that exposed students to careers. For example, students used online career exploration programs, *My Next Move* and *Career Cruising*. Mentors said that these websites helped students define their career interests and gain information about particular careers (e.g., required education and experience, salary ranges). Students said they appreciated the information they gained. As one student noted, [Y]ou learn what it takes to figure out your path. You learn about different careers. It's super helpful" (Sydney, Student focus group).

For students who already had ideas about possible career paths, WF helped them to further hone their interests and goals. One student, Sydney, described how she revised her career goal from engineering to architecture. She intends to major in math in college, but revised her long-term career goal after realizing through WF that she wanted to pursue a career that would provide her with a creative outlet:

> Although I would like engineering, I wouldn't be happy doing it…I found out that architecture has that math major plus it has creative ability put into it…I really like art, dance, all of that. I'm really into painting. I just needed something that I would be happy doing, and I feel like taking a bigger look at a specific goal that I had, which was engineering, that I really decided I want something more creative, something that I'll be happy doing for the rest of my life. And I credit Winning Futures with that. (Sydney, Student focus group)

Some mentors expressed that they wished the career exploration aspects of WF could be expanded. In particular, they recommended dedicating more sessions to exploring students' career interests. As one noted, students may have felt rushed to set a specific goal and start planning steps towards it too quickly:

> We had one day where they filled out a questionnaire and it spit out a couple of professions that might be good for them. And then, we moved on. We had to pick and go, and map out how we were going to get to the profession… But, it was just one path. [My mentee] had this one path that he was going down and there wasn't anything else. And is that realistic? Maybe. But could we have explored more? Probably. And that would have been more helpful. (Frank, Mentor focus group)

**Perceived mechanism: Synergies of career exploration alongside a caring mentor**

Career exploration coupled with mentors' support benefited students through at least two avenues. First, mentors acted as role models, exposing students to new career pathways and illuminating the specific postsecondary steps that certain jobs required. Second, mentors personalized students' career exploration experiences, tailoring their searches to students' strengths and interests and helping students to navigate postsecondary pathways.

**Mentors as role models.** Students were exposed to different career pathways through their relationships with mentors – both their own, and other mentors in the class. Jayla discussed her goal of becoming a nurse, and how she learned from her mentor's pathway to her career (which was also in healthcare); starting with experiences in high school, through college, and into her profession:

> She's very helpful because she showed me an insight in her life. [My mentor] connected how she was in high school, [to] what she needed to do to help out with college, and being in healthcare. [She] showed what she needed to do to make her succeed. She's trying to help give me insight on that so I can succeed. She's like a mother figure to me. (Jayla, Student focus group)

Some teachers and mentors even suggested increasing the time dedicated to sharing mentors' career experiences, giving students more opportunities to hear from mentors besides their own. They saw student-mentor connections as an opportunity to expose students to many different careers. As one teacher noted, "So many different careers were represented by all the mentors. I think it was a good mix of careers" (Ms. Rivers, Teacher interview). Meanwhile, some mentors and teachers encouraged even broader exposure. In particular, some noted that mentors who work in "skilled trades" and "blue collar" roles were underrepresented.

**Personalized navigation.** Study participants said that exploring careers with a mentor's help personalized students' searches and plans. As one example, teachers said that browsing the career exploration websites with their mentors' support gave those experiences "more substance" than when students used them on their own in school (a common experience for many high

schoolers). Teachers said that students who might otherwise be uneasy asking questions about careers in front of their classmates benefited from mentors' individualized support. Jayla described several ways that writing a post-high school plan with a mentor impacted her postsecondary planning:

> Well, I knew where I want to go [to college], but it's what I want to major in and different programs [to enroll in]. My mentor gave me different programs to take. And scholarships. I can get different scholarships for, if you're in a certain mile radius, then I'll get the scholarship. So, reach out to them and see what kind of programs they have. Always ask, always reach out. They just want to give away money. Everyone wants to give away money – universities and colleges – so just take that opportunity. Don't take it for granted. (Jayla, Student focus group)

Teachers saw mentors asking questions to delve into students' interests as they used career exploration websites. Mentors shared that this helped them to build stronger relationships with students. One mentor noted, "When you're pinpointing information about the mentees, you can see them start to open up because you're speaking to them about them, and you're learning about them and sharing your own failures with them to encourage them" (George, Mentor focus group). Mentors shared that they appreciated being able to tailor their advice to students' particular interests. For instance, a student who aspired to own a clothing label whose mentor, Frank, suggested starting out by seeking a job in retail. Another mentor appreciated how the personalized approach emphasized students' strengths. This mentor noted:

> When we started talking about strengths… one of my students was very much involved in art, and we got a chance to hone in on what she was really great at. And that started to build her confidence that she could even consider a career based on her gifts and her skillset in art. It was the idea of, "What are my strengths? What are my weaknesses? I could be successful with what I'm really, really great at" (Chloe, Mentor focus group).

**Barriers to career mentoring effectiveness**

A final focus of focus groups and interviews were the barriers limiting WF's impacts and ways participants felt WF could improve to better serve students. Mentors and teachers offered the most ideas about program improvement; students, on the whole, were happy with WF as it was, and proposed fewer changes.

The main barrier participants named was the failure to build mentor-student connections early on, or at all for some pairs. Some mentors said they only ever formed weak connections with

their mentees and that this was a major barrier to greater programmatic impact. These mentors expressed feeling discouraged about not establishing the strong relationships they had hoped for.

Some mentors framed the challenge of establishing relationships in terms of a lack of time. For example, they wished for more time in the initial sessions dedicated to relationship-building. Lack of time also prevented deep connections with students who joined the program late in the year, when fewer sessions remained and even less class time was dedicated specifically to relationship-building. Suggesting how WF might facilitate stronger relationships, one mentor suggested: "I think the program should spend more time on just the relationship, and how to do that. Some students don't necessarily know what goes into building a relationship: giving a little bit of yourself, taking in what others have to offer. Maybe they don't have a lot of trust in people in their life in general, so there's an immediate guard or a barrier with them" (Chloe, Mentor focus group).

While mentors raised weak relationships as a barrier to greater impact of WF overall, they viewed this as a particular challenge after in-person sessions were suspended due to the pandemic. As one mentor noted, "If [students] don't have to participate in school, so to speak, they are certainly not going to be all hands on deck when it comes to communicating with someone they didn't get to have a great relationship with all the way through" (Tanya, Mentor focus group). Students agreed that existing relationships were essential to sustaining communication after the shift to virtual mentoring. Explaining some students' lack of response to mentors' outreach, one student said, "[Students] probably don't respond right away because they don't have, like, they might not get a bond with their mentor…[Students respond] if they connect on a personal level or have fun together" (Destiny, Student focus group).

## Limitations

This study makes several contributions to research on career development and college readiness, but there are a few limitations. First, given that the results of this study pertained to a small group of participants within a single career intervention program, readers are cautioned not to overgeneralize the potential relevance of the current findings to other interventions, contexts, or populations. Specifically, findings from this study may not apply to other career-focused interventions that lack a mentoring component. A limitation of this study – which is also a strength – is that in addition to offering several common career development activities (e.g., career exploration software, educational and occupational planning) WF also included a substantial mentoring component. This made possible an exploration of the role of relationships within career interventions, but it also sets this program and study apart from more traditional career programs.

Next, the views of the students, mentors, and teachers who participated in the study may not represent those of others in the WF program. Despite efforts to recruit a group that could offer a variety of perspectives, the participants who attended the focus groups and interviews were both available and willing to volunteer their time in exchange for a small incentive. For students especially, this meant that the participants were fairly engaged in the WF program, and their overall positive experiences may not represent those of the modal WF participant.

As I discussed earlier, I attended to the validity of my findings by spending significant time getting to know how WF operated, analyzing perspectives from multiple stakeholders, collaborating with a colleague in my application of codes, and inviting WF leaders to "member check" my findings. Nevertheless, I remain mindful that both researcher bias (how my personal and professional lenses influenced what I saw) and researcher reactivity (how others saw me) could have influenced the study's findings (Maxwell, 2013).

Finally, although the quantitative evaluation that accompanied this study included a comparison group, no qualitative data were collected from non-WF participants. When conducting social validity evaluations with a comparison group, it might be beneficial to gather information from these individuals to better gauge the relative meaningfulness of program participants' perceptions.

## Discussion

To summarize the main findings: students, mentors, and teachers identified the main benefits that students gained from career mentoring, and provided insights into several mechanisms within career mentoring programs that facilitate their success. In terms of benefits, students' increased their non-cognitive competencies in several domains, including: academic motivation and focus; teamwork; communication; self-confidence; and expectations about their futures. Students also formed and refined their career interests and plans. Finally, participants generally noted small gains in academic performance (grades, study habits, attendance), though there was some mixed evidence on this point. In terms of the mechanisms that led to these benefits, mentors provided support and accountability through their connections and communication, however, participants noted that mentors could only do so after first building strong relationships with their mentees. Participants viewed the career exploration curricular components of WF as responsible for facilitating the formation of students' career interests and plans. Finally, participants noted the synergies afforded by career exploration coupled with a mentor's support. These included mentors' role modeling and personalized navigational support.

Viewed through the lens of college readiness, it appears that career mentoring benefits students. Students, mentors, and teachers alike resoundingly cited attitudinal growth (i.e., the non-cognitive domain) as the main benefit students received. These non-cognitive competencies may be a less-commonly measured aspect of college readiness (Duncheon, 2015), but they are nonetheless important as research links them to students later success in college and their short-term performance in high school (Farrington et al., 2012). Some participants also reported positive, if small, changes in students' academic performance in terms of grades, attendance, and study habits. This was not, however, the most significant domain of improvements, as some teachers and students noted few or no academic impacts. Finally, the findings illustrated how career mentoring enhanced students' readiness in terms of navigational factors. To the extent that navigating postsecondary education pathways requires starting with a clear destination in mind, career development interventions, like this one, support students by helping them form and hone their career interests and plans. Moreover, the findings revealed that a benefit of career mentoring is being able to develop post-high school plans alongside a mentor who can personalize students' exploration and planning.

This study also illuminated several mechanisms through which career mentoring can enhance college readiness. Here, insights from SCCT provide a useful framing. Central to the model are social learning experiences in which individuals' self-beliefs are formed. The WF program offered several such experiences: exploring careers through the program's curricular activities; observing mentors as role models; experiencing mentors' support and encouragement; and personalizing post-high school planning. As a result of these experiences, students formed and honed career interests, set goals related to them, and some even took initial steps. Increased confidence and a more positive orientation towards their future goals (i.e., stronger self-efficacy and outcome expectations) were common themes across all groups of study participants.

Another pathway in the SCCT model through which programs like WF may operate is as a contextual influence. As the SCCT model shows, contextual influences support students' choice goals and actions. In the WF program, for example, participants noted how mentors' encouragement and regular communication boosted students' motivation and focus in their current classes, citing these improvements as one of the main ways students benefit from Winning Futures.

Looking across mechanisms, it is clear that strong mentoring relationships are integral to the success of career mentoring. The learning experiences afforded by career development activities can more directly impact students' self-efficacy and outcome expectations when someone helps to tailor

the activity to students' strengths and interests. Students are more likely to view their mentors as role models when they feel a sense of trust and connection to them. Consistent and productive communication outside of in-person mentoring sessions depends on establishing a mentoring bond in the first place. The centrality of relationships to the benefits of career mentoring was underscored by participants' feedback that lack of mentoring bonds was the biggest barrier to greater program impact.

## Conclusion: Implications for practice and future research

To conclude, although career mentoring has the potential to enhance college readiness, especially in terms of non-cognitive and navigational factors, it also requires an investment in strong student-mentor relationships. Programs can engage practices that support strong relationships, but fostering these bonds can nonetheless be difficult and take time. Although this means that career mentoring is unlikely a scalable approach to enhancing college readiness, certain aspects of such interventions could still apply to other school-based efforts.

As this study showed, personalized support deepened students' engagement with career exploration activities. Many middle and high schools use career exploration software and require students to develop post-high school plans (Hooley et al., 2011). Instead of navigating these resources alone, this study suggests that students would likely benefit from receiving some form of mentoring or coaching as they craft their educational and occupational plans.

This study also demonstrated that students found regular virtual communication with their mentors to be meaningful. Participants identified text-messaging as the most common form of outreach, and they noted that mentors' encouragement enhanced students' academic motivation and focus. This suggests that school-based student supports generally, and efforts to enhance college readiness especially, might benefit from adopting methods of regular virtual outreach to students. Students in this study appreciated the encouragement they received from mentors' outreach, and mentors believed their communication helped students reach their goals by holding them accountable.

At least two implications for further research emerged from this study. First, future studies might survey career mentoring participants along the various dimensions of SCCT. This model provided a useful framing in the current study for several mechanisms by which career mentoring enhances college readiness. By foregrounding SCCT, future research might more fully explore each mechanism, and could possibly raise others which this study may have overlooked. Second, building on this study's conclusions about the importance of both mentoring relationships and virtual

communication, future research might explore approaches to improve mentoring programs by bolstering virtual connections. To this end, Chapter 5 presents the impacts of an intervention implemented within the WF program to support mentor-student virtual communication.

Figure 4.1 Social cognitive career theory model of person, contextual, and experiential factors affecting choice behavior.

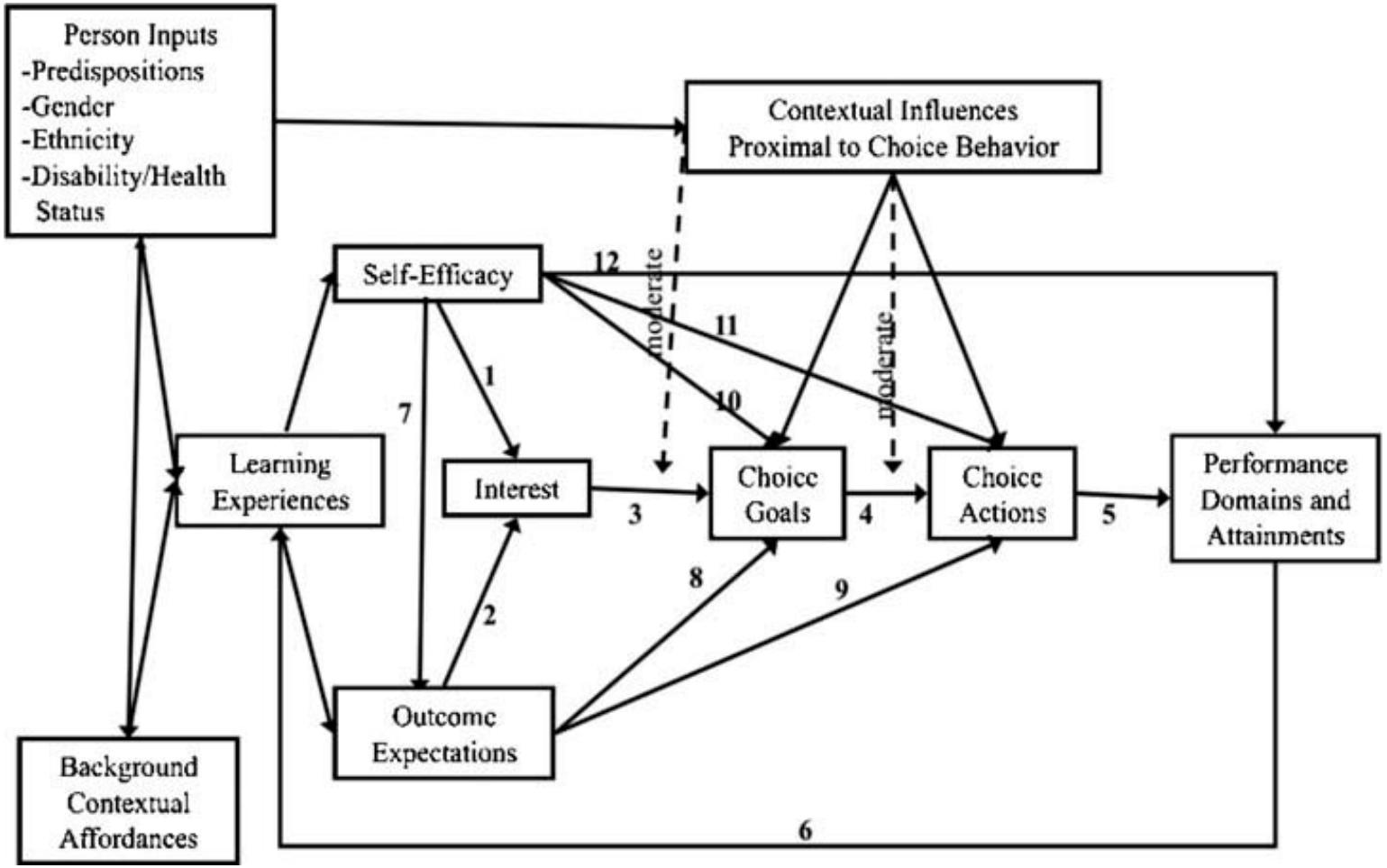



Table 4.1 Study participants' pseudonyms and background information

| **Student participants** | | | | |
|---|---|---|---|---|
| Pseudonym | Social identities | High School | Career interest | Personal introduction |
| Sydney | White, girl | Westview Academy | Architecture | Is a dancer, has a dog, likes math and architecture |
| Gabriel | White, boy | Westview Academy | Undecided | Enjoys dance, is a writer, likes making people smile |
| Jayla | Black, girl | Ravenswood | Nurse | Has played tennis for 6 years, GPA of 3.5, outspoken |
| Destiny | Black, girl | Central Technical | Film editor | Enjoys Spanish, goofy, ambitious, GPA of 4.0, Honor Society, Step Team, Student Council |
| Kaylen | Black, girl | Central Technical | Nurse | Plays softball, is caring and fun |
| Chantelle | Black, girl | Oak Grove | Forensic artist | Loves to draw, dance; plays the alto saxophone; likes photography |
| Aaliyah | Black, girl | Oak Grove | Medical field | Has a pet turtle; won WF student of the year award; loves pink, nature, and flowers |
| **Mentor Participants** | | | | |
| Pseudonym | Social identities | High School | WF Experience | Role, Career field |
| Nicole | White, woman | Westview Academy | 4 years | Recruiting, Business services |
| Eric | White, man | Westview Academy | 4 years | Buyer, Automotive products |
| Michelle | White, woman | Ravenswood | 1 year | Manager, Human resources |
| David | White, man | Ravenswood | 1 year | Lawyer |
| George | White, man | Central Tech | 4 years | Career counseling |
| Tanya | Black, woman | Central Tech | 5 years | Accounting, Automotive products |
| Jeremiah | Black, man | Central Tech | 1 year | Marketing, self-employed |
| Kathryn | White, woman | Central Tech | 1 year | Auto manufacturing |
| Amy | White, woman | Oak Grove | 2 years | Human resources, Auto insurance |

**Mentor Participants, continued**

| | | | | |
|---|---|---|---|---|
| Frank | White, man | Oak Grove | 1 year | Advertising sales, Social media |
| Jack | White, man | Oak Grove | 4 years | Retired |
| Chloe | Black, woman | Oak Grove | 1 year | Electrical contractor |
| Daniel | Black, man | Oak Grove | 3 years | Detroit-based clothing company |

**Teacher Participants**

| Pseudonym | Social identities | High School | WF Experience | Courses taught |
|---|---|---|---|---|
| Mr. Miller | White, man | Westview Academy | 2 years | World History |
| Ms. Smith | Black, woman | Ravenswood | 8 years | Social Studies, College Prep |
| Mr. Clark | White, man | Central Tech | 1 year | World History, Homeroom |
| Ms. Nolan | White, woman | Oak Grove | 5 years | English 10 and Honors English |
| Ms. Rivers | Black, woman | Oak Grove | 1 year | Chemistry, Physics |

Table 4.2 Organization of focus group and interview themes across social validity dimensions

| | Social Validity Dimensions | | | | |
|---|---|---|---|---|---|
| | Social importance of intervention effects | Perceived feasibility | | | |
| Clusters | Perceived benefits of WF | Mechanism: Mentoring | Mechanism: Career exploration curriculum | Mechanism: Synergy of mentoring, career exploration | Barriers to greater program impacts |
| Themes | • Non-cognitive competencies<br>• Future planning<br>• Academics<br>• No impacts | • Consistent presence and advocacy<br>• Communication and accountability | • Forming and honing interests and plans<br>• Practicing professional skills | • Mentors as role models<br>• Personalized navigation | • Lack of mentoring bond<br>• Lack of time |
| Example responses | "…The confidence to start going out there and actually accomplishing some of these goals" (Mentor)<br><br>"I always keep my grades up, but being in Winning Futures allowed me to have that motivation to keep on going even when I wanted to give up." (Student)<br><br>"The largest impact is the career choice" (Teacher) | "Just being an observer in every class session I saw them making connections with their mentors…I think a lot of their mentors really made a big difference for them and are very positive." (Teacher)<br><br>"We text a lot, a lot, a lot. So [my mentor] makes sure she keeps us on track and stuff." (Student) | "I think they became more in tune to what happens after high school. Some students don't get that mindset until they graduate. And if they can start getting that mindset of, 'Okay, what's next? What am I doing after this? What comes in 5 years? or, 'What do I think I'll be? Where will I be in 15 -20 years from now?'" (Teacher) | "…To kind of hone in on what she was really great at, and then build that confidence where she could even possibly consider a career based on her gifts and her skill set in art. So, I think that whole idea of, 'What are my strengths? What are my weaknesses?' You know, 'I could be successful with what I'm really, really great at.'" (Mentor) | "Some [students] just might not value the relationship or maybe like I said earlier, 'Making sure that the mentor-mentee relationship is a good connection.'" (Teacher) |

| | Social Validity Dimensions | | | |
|---|---|---|---|---|
| | Social importance of intervention effects | Perceived feasibility | | |
| Example responses, continued | "I really couldn't tell you if it's helping or not helping academically, to be honest. But I do think in life having another person in your corner is very beneficial to a lot of these kids. But again, I don't know that I could measure them doing better in school compared to kids who are not in the program." (Teacher) | "So they [i.e., WF activities] are definitely helpful because you learn what it takes to figure out your path. You learn about different careers. It's super helpful, for sure." (Student) | "With my girls... very attentive, very appreciative of the navigation through college and careers. They had already figured out what they wanted to do or what they thought they wanted to do, and we were able to hone in where to go from there." (Mentor) | "So my feedback was: More of the team building fundamental stuff up front so that you have that connection with them. I know my girls were just overwhelmed with the amount of activity that we'd have to do in class without actually having a relationship with me and without being able to build that relationship up front." (Mentor) |

# Chapter 5

## Can Nudging Mentors Weaken Student Support?
## Experimental Evidence From a Virtual Communication Intervention

With many students attending school remotely due to the COVID-19 pandemic, mentoring programs have a critical role to play in mitigating students' struggles. Learning losses have been greatest for students of color and students from low-income backgrounds, who may have less access to supervised instruction and adult support and who are most likely to be starting the schoolyear remotely (Raj  Chetty, Friedman, Hendren, Stepner, & Team, 2020; Gross, Opalka, & Gundapaneni, 2020; Hanushek & Woessmann, 2020). Moreover, the closure of school buildings restricted access to mental health services and social support networks for these students, many of whom are bearing the heaviest burdens in terms of family bereavement, economic uncertainty, housing instability, racial injustices, and trauma. Teachers, school counselors, nurses, social workers, and other school personnel play a critical role in identifying students in need of social-emotional and mental health supports. In fact, the vast majority of students who ever obtain mental health services do so through their school (Rones & Hoagwood, 2000; Whitaker et al., 2019), a challenge that likely disproportionately impacts marginalized students in the midst of school closures. Social distancing has further isolated these youth from face-to-face connections with coaches, extended family, afterschool staff, and other caring adults who could help them cope with the pandemic and racially charged news and events.

To fill the gaps in student support created in the wake of school closures, mentoring programs and schools alike are launching new initiatives to connect with students through virtual modes of communication (AIR, 2020; CASEL, 2020; Simonton, 2020). Volunteer mentors, perhaps more readily than overwhelmed teachers and school counselors, are well-positioned to offer students individualized attention and connection. As mentoring organizations pivot to provide online mentoring, they require guidance about the best ways to prepare and support the adults responsible for connecting virtually with youth.

This paper presents results from a randomized experiment testing the effects of a mentoring intervention designed to encourage and enhance virtual communication. Although designed with a

youth mentoring context in mind, the lessons learned from may apply anywhere student support is offered virtually.

The Winning Futures school-based career mentoring program supports youth in Metro Detroit high schools by pairing young people with adult mentors from the local business community. Through its career exploration curriculum and small group mentoring, the program aims to equip youth with the skills and attitudes necessary for success beyond high school. Although primarily an in-person program, Winning Futures leaders encourage mentors to connect with students by email, text message, or phone at least monthly. Evidence from prior school years indicated, however, that many mentors and students did not communicate much, if at all, outside of in-person meetings. To address this, during the 2019-20 school year, a randomly selected group of mentors received monthly messages reminding them to communicate virtually with students. The messages contained examples of discussion-starters that mentors could use to initiate communication with their mentees (e.g., "What's new since we last met?" and "What are you looking forward to this week?"). Three mentor reminders were sent approximately one month apart during Spring 2020. An end-of-program survey, administered in April 2020, assessed the impacts of the intervention.

Unexpectedly, the results showed that although the informational reminders did not make mentors any more (or less) communicative, they reduced the rate at which students responded to their mentors' communications and also reduced the likelihood that students reached out on their own to their mentors. Moreover, and possibly as a consequence, mentors who received the intervention gave worse ratings of their relationships with students at the end of the program, and students whose mentors received the intervention gained less from the mentoring program as a whole in terms of attitudinal growth.

Exploratory analyses investigated how reminding mentors to reach out could lead to worse ratings of mentoring relationships and student attitudes. The results revealed that treated students sent fewer text messages – students' main method of virtual outreach – and that they were less-responsive to their mentors' texts and calls. Meanwhile, there was suggestive evidence that the mentor reminders may have shifted the mode of communication mentors used to reach out (towards emails, and away from text messages and phone calls) and may have updated mentors' understandings about the ideal frequency of virtual outreach (to about once per week). These findings underscore the importance of carefully attending to the content of reminder nudge messages.

Taken together, the results suggest that light-touch informational reminders can affect virtual communication, but that the direction of those effects is not unambiguously positive. This study's findings add an important nuance to the evidence on how behavioral interventions in educational contexts operate. Although past studies find that reminder nudges can support individuals' engagement in discrete tasks, prescribing relational practices may be less effective. Reminders must be carefully designed in order to yield the intended benefits for students.

The remainder of this paper is organized as follows: The next section reviews prior research on youth mentoring programs and how they can improve, with a particular focus on student support via virtual communication. This review also presents findings on the effects of behavioral interventions like the one tested by the current study. The following section describes the current study's context and details about the intervention. A fourth section presents the methods of analysis and a summary of findings, including an examination of possible mechanisms that may explain the negative impacts of informational reminders. Finally, the paper concludes with a discussion of this study's implications for mentoring programs and educational practice more broadly.

## Background: Improving mentoring programs to enhance youth support

Youth mentoring programs pair young people with caring adults who can be advocates and role models. Through close, trusting relationships mentors shape youth's social-emotional, cognitive, and identity development in ways that promote a broad range of positive outcomes (Rhodes et al., 2000; Rhodes et al., 2006). Over the past decade, mentoring has become a common approach to supporting youth, with significant financial resources dedicated to programs and an estimated 2.5 million adult volunteers serving as mentors each year (Raposa, Dietz, & Rhodes, 2017; Raposa et al., 2019). Such substantial investments are backed by a large body of research demonstrating the positive effects of mentoring. Experimental and quasi-experimental findings across studies show that mentored youth perform better academically, receive fewer disciplinary referrals in school, self-report more positive perceptions of their abilities and college prospects (Herrera et al., 2011; Maynard, Kjellstrand, & Thompson, 2014; Woods & Preciado, 2016).

Yet while existing research demonstrates the potential for mentoring to benefit youth, the magnitude of the measured impacts is often rather modest. Several meta-analyses report average effects of only about one fifth of a standard deviation on outcomes such as: emotional well-being, high-risk behavior, social competence, academic improvement, and employment success (DuBois et al., 2002; DuBois et al., 2011; Raposa et al., 2019). Effect sizes of around 0.2 standard deviations are typically considered small to medium for educational interventions (Cohen, 1988; Kraft, 2019).

Thus, although mentoring can support a host of positive youth outcomes, many programs, at least as they are currently implemented, appear to have room to improve. This raises the question, what can be done to strengthen mentoring programs to ensure they more often realize their promise?

**Promising practices for mentoring program improvement**

Given the potential for mentoring to benefit youth in many positive ways, yet the relatively modest results observed for many programs, there is much to be gained by identifying promising strategies for program improvement. To that end, past studies have sought to identify factors associated with greater program effects and have typically concentrated on three common areas: youth, mentor, and program characteristics. Among these, program characteristics and practices offer the most promising avenue to increased impacts.

Much of the evidence on mentoring program improvement comes from meta-analyses which compare the effects reported across numerous studies of mentoring programs. These analyses explore whether differences in the backgrounds of the participating youth and/or mentors can account for the differences in outcomes observed across programs. Although evidence does suggest that youth who have experienced greater individual and environmental risk have more to gain (DuBois et al., 2011; Tolan et al., 2008), there is not consistent evidence that the sociodemographic characteristics of youth, or their mentors, are the main drivers of differences in overall program effects. One exception is mentors' professional backgrounds. Specifically, stronger effects have been reported by programs that recruited more volunteers who work in "helping professions," that is, roles which prepare them to engage with youth (e.g., teachers, counselors; DuBois et al., 2002; Raposa et al., 2019). Taken together, prior research shows that although recruitment processes for both mentors and youth warrant attention, program structures and practices are likely a better investment of mentoring program improvement efforts. Specifically, three areas show particular promise: (1) providing mentors with adequate support and structure; (2) implementing strategies that strengthen mentoring relationships; and (3) encouraging consistent, meaningful communication.

**Providing adequate support and structure.** Past studies find that practices which provide adequate support and structure for mentors are linked to greater mentoring program impacts. Examples of practices shown to drive programs' effects include the following: offering ongoing training for mentors, organizing structured activities for mentors and youth, setting expectations regarding the frequency of contact, ensuring mechanisms for support and involvement of parents, and monitoring overall program implementation (DuBois et al., 2002). As this list reflects, mentors can be most effective when provided with ongoing, program-level supports that set and assist them

in meeting clear expectations for engagement. Prior evidence also shows that one such effective support is providing mentors with clear, purposeful expectations for their roles. Specifically, DuBois and colleagues' (2011) meta-analysis revealed that programs in which mentors filled advocacy-oriented roles (i.e., they served as a source of information or guidance) reported higher average effects.

**Strengthening mentoring relationships.** Practices that promote close mentoring relationships represent a second, and key, approach to program improvement. In fact, prior research shows that the quality of mentoring relationships may be one, if not the, key mechanism through which programs impact youth. As just one example, Bayer, Grossman, and DuBois (2015) conducted a reanalysis of data from the large-scale experimental evaluation of the *Big Brothers Big Sisters* (BBBS) school-based mentoring program undertaken by Public/Private Ventures (Herrera et al., 2007). The authors examined whether mentees' feelings of closeness may be the causal mechanism through which mentoring programs, like BBBS, impact academic growth and found evidence to suggest that this is the case. Using a two-stage least squares approach, and by including controls for students' abilities to form relationships with teachers, the authors found that the program's effects on every measure of academic improvement were mediated by students' sense of closeness to their mentor. In other words, the authors concluded that, unless mentoring pairs formed relationships that the youth would rate as "close," participation in the BBBS program had "no discernable effect" on students' end-of-year academic outcomes (Bayer et al., 2015, p. 425).

**Encouraging consistent, meaningful communication.** In light of evidence demonstrating the importance of forming strong mentoring bonds, a few studies have explored the factors associated with youths' and mentors' perceptions of higher quality mentoring relationships. L. Kern, Harrison, Custer, and Mehta (2019), for instance, examined the implementation of the *Check & Connect* mentoring program across 27 schools and five states. Using surveys of mentored high schoolers and their mentors, the authors gauged participants' perceptions of and preferences related to their mentoring relationships. The results indicated that neither age, race, nor gender – either that of the mentors, mentees, or their correspondence – were significant predictors of participants' relationship ratings. Results did show, however, that the topics discussed during mentoring sessions significantly predicted relationship quality. Specifically, discussions about school and future plans were perceived as helpful and predicted stronger ratings of the relationship among both students and mentors. Additionally, L. Kern et al. (2019) found that nearly one in five mentees expressed a desire for more frequent meetings (more often than once a week, in the case of this

study). Together, these findings underscore the importance of fostering both meaningful and consistent exchanges between mentors and mentees. The authors, thus, concluded that programs leaders might consider approaches to increasing mentors' availability in order to increase their programs' overall effects.

**Enhancing virtual communication.** Although increasing the frequency of mentor-mentee contact may be beneficial, many mentoring programs already face time and resource constraints. This may be especially true for school-based programs operating within the timeframe of a typical school day. As a result, finding time for additional in-person meetings may not be practical or even feasible. Moreover, school closures and social-distancing requirements as a result of the COVID-19 pandemic are currently preventing many youth mentoring providers from interacting with youth face-to-face. Given these constraints, virtual modes of communication may offer a promising alternative.

Prior research shows that virtual communication (e.g., text messaging, email, phone and video calls) can help to foster relational connectedness between young people and adults in educational settings. One example comes from a study in which students and teachers identified practices they viewed was most supportive of social-emotional learning for academically at-risk youth (Brockman, 2019). Practices that fostered relationships and communication emerged as key domains of support, and specifically, students saw teachers' consistent use of "out-of-school messages" as an essential practice. Students reported that teachers' messages, even those focused on academics, communicated their care for students and built students' sense of connection. Importantly, the context for this study was an alternative high school serving a high percentage of academically at-risk students, and participants identified practices they viewed as particularly supportive of youth who were off-track from on-time high school graduation.

To summarize, prior research suggests that mentoring programs can bolster their effects by supporting mentors with adequate structure, strengthening mentoring relationships, and encouraging consistent communication. Given evidence that students may view virtual communication as particularly supportive, and in light of the restrictions on in-person meetings currently faced by many programs, virtual methods of communication offer a promising avenue through which to pursue mentoring program improvements. The current study evaluates the effects of an intervention designed to strengthen mentor-mentee outreach via text messaging, email, and phone. In addition to contributing evidence on the value of and best practices related to virtual communication, the

findings also extend prior research on the use of behavioral interventions, or "nudges," in educational contexts.

**Behavioral interventions in education**

Behavioral interventions are an increasingly common approach to supporting educational outcomes. Often using low-cost, light-touch strategies, these interventions nudge students and the adults that support them to take small steps that can lead to big differences in their learning (Dynarski, 2017; Oreopoulos, 2020). The conclusion from many recent studies is that although few interventions produce positive results for all – and some even have negative effects – nudges can be effective for individuals and in situations most constrained by the behavioral barriers that the interventions target (Damgaard & Nielsen, 2018). For example, several recent studies test the effect of nudging graduating high schoolers and early college students to complete the requirements to enter, stay enrolled, and succeed in college (Bird, Castleman, Goodman, & Lamberton, 2017; Castleman & Page, 2015, 2016, 2017; Kizilcec, Schneider, Cohen, & McFarland, 2014). Results indicate that the reminders were effective, especially when they concerned discrete tasks (e.g., completing financial aid applications or contributing to an online forum).

Recent studies reveal particularly positive impacts of sending informational reminders to the adults responsible for supporting students' learning (e.g., parents and teachers). Individuals' attention is limited, which means people are prone to forgetting to make key decisions and taking key actions. Parents and teachers are no different. Reminder nudges work by refocusing attention on the problem or task. They also have informational value, by reminding individuals of already-known information or providing easy access to new information. Informational reminders can be delivered as emails, text messages, letters, or by other modes of communication and typically include succinct messages with information relevant to students' educational situations or progress.

Studies of reminder nudges consistently find positive effects on parents' engagement (Damgaard & Nielsen, 2018; Oreopoulos, 2020). Moreover, such interventions also appear to boost students' school performance and skills. For example, several studies assessed the effects of sending parents of young children messages containing practical early literacy development tips. The results indicated that the reminder messages increased both the parents' use of literacy activities and certain aspects of the students' learning (Doss, Fahle, Loeb, & York, 2019; York, Loeb, & Doss, 2019). Reminders sent to parents of school-aged children have also been shown to support student outcomes such as grades, courses passed, and school attendance (Bergman, 2015; Bergman & Chan, 2019; Robinson, Lee, Dearing, & Rogers, 2018). Bergman (2016), for example, showed that simply

informing parents about how to use an online portal to track their student's performance increased the grades earned by middle and high school students. Rogers and Feller (2018) found that letters reminding parents about the importance of regular school attendance reduced both overall and chronic absenteeism.

Taken all together, existing evidence on the effects of behavioral interventions in educational contexts shows that even fairly light-touch nudges can sometimes yield at least modest gains. In particular, research on informational reminders paints a positive picture of their potential to both alter adults' behavior through increasing their engagement, and to improve student outcomes. Less clear, however, is whether these positive results might translate to relational practices and contexts, such as mentor-student communication and virtual student support. Discrete tasks and relational practices may differ in key ways that make nudges either more or less effective. Virtual communication may need to occur organically in order for it to feel authentic to students. On the other hand, reminder nudges may prove to be even more important in the context of virtual mentoring if the reminders help to sustain mentors' attention and engagement in the mentoring relationship between in-person meetings. Either way, the extent to which existing evidence on reminding individuals to complete discrete tasks may, or may not, apply to relational practices remains an open question.

## Current Study

### Research context: Winning Futures school-based career mentoring program

This study took place in partnership with the Winning Futures (WF) career mentoring program which served students at seven Metro Detroit high schools during the 2019-20 school year. WF is a school-based program that embeds a structured career exploration and goal setting curriculum in teachers' classrooms and matches students with volunteer adult mentors from their local professional communities. Throughout the study, participants attended weekly in-person sessions in which they practiced workplace etiquette and discussed students' career goals.

In addition to a career exploration curriculum, mentoring by local business professional is a central feature of the WF program. WF representatives conduct an in-depth interview process to select volunteer mentors and new mentors attend multiple training sessions throughout the year. Each mentor is typically matched with three students, a process that WF representatives also dedicate great care to. WF leaders use students' pre-survey responses to match them with a mentor: pairs are matched first by gender and next by career and other personal interests (e.g., girls interested in STEM are matched with female engineers).

Mentors and students spend significant time during WF sessions building relationships. Many sessions feature team-building activities and several are mentor "free" days when mentors select activities to engage their assigned mentees based on the students' interests.

In addition to building relationships during class sessions, WF leaders encourage mentors to communicate with their mentees via text message, email, and phone at least once per month. Feedback from prior cohorts suggested, however, that virtual communication was an area for growth within the WF program. Although students reported that they appreciated their mentors' messages, mentors reported low rates of response from students. Thus, WF leaders identified virtual communication as an area for program improvement efforts during the 2019-20 school year.

**Bolstering virtual outreach: Mentor nudge intervention**

In an effort to strengthen virtual communication, a random subset of mentors were selected to receive additional encouragement from WF to reach out to mentees. Approximately monthly emails contained specific prompts intended to support productive mentoring exchanges. These informational reminders encouraged mentors to reach out by reminding them of WF's expectations for regular between-session contact and by suggesting ideas for how mentors might initiate conversations with mentees. Figure 5.1 displays an example of the mentor reminder messages.

**Current study contributions**

The current paper fills several gaps in our collective knowledge about improving mentoring programs, using virtual communication to support students, and behavioral interventions as a means to achieve those two ends. This study experimentally tested the effect of a low-cost, light-touch mentoring intervention on virtual communication and its subsequent impacts on mentoring relationship quality and student attitudinal growth. These findings may be more valuable now than ever before, as all students, and especially those marginalized by school systems, face additional challenges, yet their access to school-based supports are restricted. This study also fills a gap in our understanding of how to improve mentoring programs more broadly. Although prior research supports a link between mentor-mentee communication and relationship quality, I am not aware of any other studies that directly examine how the frequency of exchanges relate to participants' sense of connection. Finally, this is also the first study, to my knowledge, to apply a behavioral intervention in the context of a mentoring program. While past studies establish that informational reminders can support engagement in concrete educational tasks, much less is known about how such interventions effect relational practices and the provision of student support.

### Research questions

To fill the aforementioned gaps, this study presents the results of a randomized control trial of an intervention designed to bolster virtual communication between high school students and adult mentors. The experiment evaluated the effects of mentor nudges (i.e., informational reminders) on several outcomes, including: mentor-student communication frequency, student responsiveness, mentoring relationship quality, and the student attitudes targeted by the overall mentoring program (e.g., self-efficacy, goal orientation, and perseverance). The following research questions guided the analysis:

1. Prior to receiving any informational reminders, was more frequent virtual outreach associated with differences in mentoring relationship quality or students' attitudes?
2. Does reminding mentors to reach out by providing structured communication prompts (i.e., informational reminders) increase the frequency of mentor-student communication?
3. Do informational reminders increase students' responsiveness to mentor communication?
4. Do informational reminders support stronger mentoring relationships?
5. Do students whose mentors received informational reminders benefit more in terms of attitudinal improvements (specifically, self-perceived self-efficacy, growth mindset, goal orientation, perseverance, and adult support)?

## Methods

### Randomization

Each WF adult volunteer mentored about three students, and thus the study used a clustered RCT design with students nested within mentors. Random assignment was conducted at the mentor-level, with half of all mentors randomly assigned to receive monthly informational reminders to reach out to students (treatment) and the other half assigned to "business as usual" (comparison).

I selected the treatment and comparison groups using a rerandomization procedure (Morgan & Rubin, 2012). This ensured balance across the groups in terms of pre-treatment student and mentor characteristics. In experiments with small samples, such as this, it is not uncommon for random assignment to result in treatment and comparison groups that are unbalanced in important ways, and rerandomization procedures guards against this possibility. To begin, I prespecified the following balance criteria: no single difference between the treatment and comparison group would exceed an effect size of 0.15 and the average standardized difference between the groups would also be below 0.15. I applied these criteria to the following baseline covariates: mentors' gender and race (closely related to students' gender and race); mentors' experience mentoring; and the within

mentor-group average of students' interest in the Winning Futures program as measured by the pre-program survey. Next, I randomly assigned half of the mentors (along with their mentees) within each school to the treatment and comparison groups. Stratification by school ensured roughly even numbers in the treatment and comparison groups at each site. I saved each randomization that satisfied the prespecified threshold, discarding those that did not, and repeated the process 500 times to obtain a set of 144 possible randomizations. From these, I randomly selected one of the balanced randomizations to assign mentors to the treatment group.

**Participants**

The experiment originally included all mentors and students participating in WF during the 2019-20 schoolyear across the seven schools where WF operated mentoring programs (about $N$=494 students assigned to $N$=143 mentors). Due to low response rates on the end-of-program survey, however, the final analytic sample included only a subset of the original participants ($N$=192 students; $N$=102 treatment and $N$=90 comparison; and $N$=114 mentors; $N$=59 treatment and $N$=55 comparison). The abrupt shift to online mentoring disconnected many students from the WF program as whole, and as a result, the overall survey response rate for students was somewhat low (39 percent). Encouragingly, mentors responded at a much higher rate (80 percent), and the differences in response rates across the treatment and comparison groups were very small (3.3 percentage points for students, and 0.02 percentage points for mentors). This is reassuring because it means that whether or not students and mentors responded to the post-survey did not appear to be linked to their treatment group status. Furthermore, the rates of overall and differential non-response for mentors were far below the boundary established by the What Works Clearinghouse for interpretation under both cautious and optimistic assumptions, whereas the rates for students lay just beyond (What Works Clearinghouse, 2020) Thus, while students' overall low responses mean that conclusions from this study may not accurately represent the original experimental sample, there was no reason to suspect that survey non-response weakened the internal validity of the findings, and it is still possible to draw causal claims about the impact of informational reminders.

**Measures**

To evaluate the effects of mentor reminders on virtual communication, I focused on two main outcomes: frequency of weekly virtual outreach and student responsiveness. Students' and mentors' reports for both outcomes were collected on a post-survey. For the purposes of multiple hypothesis testing considerations, described below, I treated the analyses of these two outcomes as confirmatory. I also explored effects on several additional outcomes, including: students' and

mentors' ratings of their relationships, and the student attitudes targeted by the overall mentoring program (e.g., self-efficacy, goal orientation, and perseverance). For the purposes of multiple hypothesis testing considerations, I considered these analyses exploratory.

All of the measures I analyzed were self-reported by students and mentors on surveys. WF leaders administered a pre-program survey at the start of the school year (Sep 2019), a baseline survey at the beginning of the experiment (Jan 2020), and a post-survey administered at the end (April 2020). I used mean-imputation to address missing data on all baseline measures. The section below describes each outcome in greater detail, and Appendix Table B.1 displays sample items, information about internal consistency, and the dates of data collection.

**Outreach frequency.** Baseline and post-surveys asked students and mentors to rate the frequency with which, during a typical week, they engaged with one another in the following ways: received a text message, received an email, received a phone call, sent a text message, send an email, gave a phone call. All of the frequency items used the same scale: 0 times, 1 time, 2 times, 3-5 times, and more than 5 times. It is worth noting that because the outreach frequency items only asked about communication during a typical week, it is possible that the measures might obscure intervention impacts on less-frequent communication (e.g., mentor or student outreach that occurred once or twice a month).

Mentors reported their outreach to each of their mentees separately. For each individual, I summed the ratings of outreach frequency across each virtual format to create scales that ranged from zero interactions in a given week up to 15 possible interactions (responses of "3-5 times" were coded as 4 and "5 or more interactions" were coded as 5). Before conducting analyses, I standardized all outcomes to the comparison group mean and standard deviation such that the estimated treatment effects represent effect sizes.

**Student responsiveness.** Students and mentors each also rated students' responsiveness to mentors' communications. Using the response categories "Never, Rarely, Sometimes, Always" students were asked how often they respond when their mentor reached out via text, email, and phone call (separate items, averaged across communication methods to create a single composite variable). Mentors responded to parallel items about each mentee's responsiveness.

**Mentoring relationship quality.** Relationship quality in youth mentoring contexts refers to participants' sense of connection and shared goals. Prior research has differentiated between two dimensions of quality: relational and instrumental (Nakkula & Harris, 2014). Relational quality refers to how the mentor and mentee feel about each other and their relationship. Subconstructs that

compose relational quality typically include relational satisfaction, feelings of closeness, relational compatibility, and relational competence. Instrumental quality, on the other hand, measures the extent to which the mentoring relationship is oriented towards the youth's growth. Although relational quality has received more attention in prior research, both are related to positive youth outcomes (Anderson, Christenson, Sinclair, & Lehr, 2004; Grossman & Johnson, 1998; Herrera, Sipe, & McClanahan, 2000; L. Kern et al., 2019).

Mentoring relationship quality (MRQ) was measured from both students' and mentors' perspectives using parallel surveys developed to assess MRQ from each participant's perspective. Mentors items came from the *Match Characteristics Questionnaire* (Harris & Nakkula, 2018a); student-rated items were adapted from the *Youth Mentoring Survey* (Harris & Nakkula, 2018b). These measures were originally developed using diverse samples of U.S. youth of all grade-levels and their mentors who participated in large mentoring organizations, and published results indicate that each scale had good internal consistency (Karcher, Nakkula, & Harris, 2005).

Students rated their sense of relational quality, or the degree to which they felt happy, close, and satisfied with their mentoring relationship. Relational quality was assessed by 14 items (baseline $\alpha$=0.92; post-survey $\alpha$=0.93) such as, "My mentor and I are close (very good friends)" and "My mentor makes me feel special." The response categories for these items ranged from, "1=Not at all true" to "4=Very true." They also rated the instrumental (i.e., growth-oriented) quality of their mentoring relationships. Instrumental quality was assessed by eight items (baseline $\alpha$=0.88; post-survey $\alpha$=0.92) such as, "I talk with my mentor when I have problems or things that worry me" and "My mentor helps me get in less trouble (make better decisions, behave better, etc.)."

Mentor surveys measured two relational quality subconstructs: closeness and satisfaction. Four items (baseline $\alpha$=0.85; post-survey $\alpha$=0.82) assessed mentors' sense of closeness to their mentees, for example, "I feel like my mentee and I are good friends (buddies)" and "My mentee shows me how much he/she cares about me (says things, smiles, etc.)." Five items (baseline $\alpha$=0.88; post-survey $\alpha$=0.92) assessed mentors' satisfaction or sense of fulfillment in the relationship by how frequently items such as these were true, "My mentee is willing to learn from me" and "I feel like I am making a difference in my mentee's life." Both scales used frequency responses categories with a 6-point scale from "Never" to "Always."

**Student attitudes.** The WF mentoring program as a whole aims to improve students' attitudes towards and readiness for post-secondary education and the workforce. To assess WF's

progress towards this goal, the post-surveys included measures of several student attitudes, including: self-efficacy, growth mindset, goal orientation, and perseverance.

***Self-efficacy.*** Self-efficacy refers to individuals' belief in their ability to motivate themselves and use their resources to accomplish their goals (R. Wood & Bandura, 1989). Research distinguishes between task-specific self-efficacy and general self-efficacy (GSE), which refers to individuals' belief in their ability to perform tasks across a variety of situations (Judge et al., 1998). This study measured general self-efficacy using the *New General Self-Efficacy Scale* (Chen et al., 2001). Seven items (baseline $\alpha$=0.91; post-survey $\alpha$=0.9) asked students to rate their agreement, on a five-point scale from "Strongly disagree" to "Strongly agree," with prompts such as, "When facing difficult tasks, I am certain that I will accomplish them." The NGSE scale has been shown to have strong internal consistency (published alpha levels ranging from $\alpha$=0.86 to 0.90; Chen et al., 2001).

***Growth mindset.*** A growth (versus fixed) mindset refers to an individual's core beliefs about the nature of intelligence. Prior research shows that youths' orientation towards intelligence affects the way they respond to challenges, particularly in academic settings (Blackwell et al., 2007). The growth mindset items in this study were from the *Revised Implicit Theories of Intelligence (Self-Theory) Scale* (De Castella & Byrne, 2015). Students rated their agreement, on a four-point scale from "Strongly disagree" to "Strongly agree," with three items (baseline $\alpha$=0.82; post-survey $\alpha$=0.88) such as, "You can learn new things, but you can't really change your basic intelligence." The items were tested in a diverse sample of youth (grades 10-12) and found to have good internal consistency (published alpha of $\alpha$=0.87; De Castella & Byrne, 2015).

***Goal orientation.*** Goal orientation refers to youths' motivation and ability to make viable plans and take action toward desired goals. Adolescents reporting higher levels of goal orientation tend to be more cognitively engaged in school-related tasks and act out less (Roeser et al., 2002). Goal orientation was measured using items from a survey developed by the *Flourishing Children Project* (Lippman et al., 2014). The measure included seven items (baseline $\alpha$=0.86; post-survey $\alpha$=0.85), each assessed on a five-point scale. Five of the items used "Exactly like me" to "Not at all like me" response categories, and the remaining two used a frequency response scale from "None of the time" to "All of the time." Students responded to prompts such as, "It is important to me that I reach my goals" and "I know how to make my plans happen." Psychometric analyses conducted using a sample of U.S. adolescents that was diverse in terms of age, income, race, and gender found that both scales achieved alpha levels of $\alpha$ = 0.88 (Lippman et al., 2014).

***Perseverance.*** Perseverance refers to the ability to pursue and accomplish one's goals, even in the face of obstacles (M. L. Kern et al., 2016). Prior research shows that across multiple contexts (the military, workplace sales, high school, and marriage) individuals high in perseverance were more likely to graduate from school, stay in their jobs, and remain married (Eskreis-Winkler et al., 2014). Perseverance was measured using four items (baseline $\alpha$=0.81; post-survey $\alpha$=0.79) from the *EPOCH Measure of Adolescent Well-Being* which gauged students' belief that they can complete school-related tasks (M. L. Kern et al., 2016). Two items used frequency response categories, "Almost never" to "Almost always," and two more used response categories, "Not at all like me" to "Very much like me" to gauge agreement with prompts such as, "Once I make a plan to get something done, I stick to it." Across multiple samples of U.S. youth, the internal consistency for these scales had alpha levels ranging from $\alpha$=0.72 to 0.85 (M. L. Kern et al., 2016).

***Adult support.*** Adult support gauges students' support from caring adults outside their families. This measure was adapted from the *California Healthy Kids Survey: Resilience & Youth Development Module* (WestEd, 2008) which assesses the "community protective factors" that students experience. Six items (baseline $\alpha$=0.89; post-survey $\alpha$=0.87) asked students to respond using a scale from "Not at all true" to "Very much true" to statements about adults outside their family or school, such as: "There is an adult who really cares about you," and "There is an adult whom you trust."

**Intervention timing and adaptations due to the COVID-19 pandemic**

The intervention began in January 2020, about three months after the start of the WF program, thus giving students and mentors time to build initial connections. Figure 5.2 displays a timeline of the intervention and data collection points. Three email messages were sent between January 2020 and before the closure of school buildings in March 2020 due to the COVID-19 pandemic. Two additional messages were sent following school closures. Although the effect of the final two reminders are not captured by this paper's main results, they were included in checks for the robustness of the findings (see Appendices). To summarize: the paper's main findings estimate the effect of three nudges sent prior to the pandemic using data collected shortly after the suspension of in-person mentoring. Additional surveys administered at the end of the schoolyear provide a check of the robustness of the main findings.

Immediately following the temporary suspension of in-person instruction due to the COVID-19 pandemic, WF staff adapted their outreach to connect virtually with students and mentors. Two weeks after school closures the organization sent emails to all mentors stating an expectation that mentors remain in contact with mentees via text messaging, email, or other forms

of virtual communication. When it became clear that schools would not resume in-person for the duration of the school year, WF leaders quickly adapted their curriculum to continue to engage with students online (e.g., holding meetings using the Zoom videoconference application).

Despite the challenge of adapting to an all-virtual format, WF staff remained committed to conducting a rigorous evaluation of their program improvement efforts and took several key steps to support for data collection. Shortly after in-person programming suspended, students and mentors each received links to an end-of-program survey via email. In an attempt to boost participation rates, students were offered $10 online gift cards as a reward for completing the survey. WF leaders sent personalized invitations and follow-up reminders to students and their parents letting them know about students' opportunity to participate in the survey and earn incentives.

In addition to surveys, WF leaders helped to recruit and facilitate focus groups with students and mentors after the conclusion of the program in May 2020. These conversations shed light on participants' experiences with the WF program as a whole, and several questions asked specifically about their interactions via virtual communication.

**Empirical strategy**

**Descriptive analyses.** Before estimating the impact of informational reminders on virtual communication and other outcomes, I first investigated the baseline correlates of virtual outreach frequency. These analyses described the baseline levels of communication between students and mentors (in the absence of any intervention) and assessed the extent to which greater communication was related to the perceived benefits of mentoring. To do so, I estimated a series of ordinary least squares (OLS) regressions predicting the frequency of mentor and student weekly outreach as the outcome. The predictor variables included all of the baseline covariates available at the start of the experiment (i.e., mentor and student sociodemographic characteristics, student attitudes, and mentoring relationship quality). I estimated the correlation between outreach frequency and each baseline measure individually and all together.

**Intervention impacts.** I computed the main effects of the intervention by comparing outcomes for students whose mentors received reminders with those of students whose mentors did not. I estimated the effects using OLS regressions with robust standard errors clustered within mentor groups. I specified intent-to-treat (ITT) models of the following general form:

$$Y_{ijc} = \beta_0 + \beta_1 Z_j + X_{ijc} + \delta_c + \varepsilon_{ijc} \qquad (1)$$

where for student $i$ paired with mentor $j$ in classroom $c$, $Z_j$ indicates whether the student's mentor was assigned to receive informational reminders ($Z_j$=1) or not ($Z_j$=0); $X_{ijs}$ is a vector of mentor and student covariates including an indicator for whether any baseline covariates were mean-imputed; $\delta_c$ is a classroom-fixed effect; and $\varepsilon_{ijc}$ is an idiosyncratic error term. $\beta_1$ estimates the average treatment effect of mentor reminders. Alternative specifications included a random intercept, $u_j$, to account for clustering of students within mentors instead of clustered standard errors. For ease of interpretation, I standardized all outcome measures to the comparison group mean and standard deviation such that the estimated treatment effects represent effect sizes. Standardized outcomes included the following: average weekly frequency of mentor and student outreach by text, email, and phone combined (student-reported measure of mentor outreach, and mentor-reported measure of student outreach); student responsiveness to mentors' outreach (both mentor-rated and student self-reported); student attitudes (self-efficacy, growth mindset, goal orientation, perseverance, and adult support); and mentoring relationship quality (student-perceived relational and instrumental quality, and mentor-perceived closeness and satisfaction).

**Exploratory analyses.** Finally, I conducted exploratory analyses to identify possible causal mechanisms through which mentor reminders impacted outreach frequency. I investigated the impact of the intervention on each mode of communication separately (text, email, and phone). I also explored whether the intervention's effects operated along the extensive versus intensive margin, that is, any communication versus none, or frequent versus infrequent communication. To do so, I recoded the outreach frequency and responsiveness scales as two binary variables. The first indicated no outreach or response versus any (0=no outreach/never respond; 1=any outreach/respond more often than "never"). The second variable indicated more frequent outreach and consistent responses versus less (0=fewer than two weekly touchpoints/responding less than "always"; 1=two or more weekly touchpoints/"always" responding to mentors' messages). The goal of these analyses was to shed light on how, precisely, the mentor reminders altered mentors' and students' virtual communication.

**Randomization inference.** As described above, I followed a rerandomization procedure to select the treatment and comparison groups (Morgan & Rubin, 2012). While useful for ensuring balance on covariates, rerandomization changes the distribution of the test statistic such that traditional methods of inference must be adjusted or else they will result in overly conservative *p*-values (Athey & Imbens, 2017). Specifically, I used the user-written "ritest" STATA package for

randomization inference to re-estimate the *p*-values from each of the analyses described above (Heß, 2017).

**Multiple hypothesis testing.** When the effects of an intervention on multiple outcomes are analyzed, it is important to account for the fact that the probability of detecting at least one statistically significant impact merely by chance increases with the number of outcomes considered. Although several possible approaches have been proposed (Kirk, 1994; Schochet, 2008), there is currently little consensus on the most appropriate method for adjusting statistical tests to account for multiple outcomes. Therefore, following guidelines for quantitative methods used in social experiments, I did not explicitly adjust *p*-values to correct for multiple comparisons (Shadish, Cook, & Campbell, 2002). Instead, I carefully limited the number of outcomes in the analysis, and grouped research questions into confirmatory and exploratory categories (Schochet, 2008).

## Results

### Baseline equivalence and descriptive statistics

I checked to ensure that the treatment and comparison groups were balanced across the following covariates: student and mentor gender, student and mentor race, students' free/reduced price lunch status, students' parental education level, mentors' years of mentoring experience, students' attitudes at the start of the mentoring program, and students' and mentors' baseline reports of communication and relational quality. Table 5.1 presents these descriptive statistics for the entire analytic sample and assesses the baseline equivalence of the treatment and comparison groups. Most baseline characteristics of students and mentors assigned to the treatment and comparison groups were similar and only a four were outside the range that the What Works Clearinghouse considers acceptable with statistical adjustment ($0.05 \leq$ Effect size $\leq 0.25$). Specifically, treated mentors were less-likely to be Black; treated mentors and students reported lower levels of mentoring relationship quality; and students of treated mentors self-reported having lower levels of a growth mindset.

With a comprehensive set of baseline covariates, testing for balance on each increases the probability of Type I error. I therefore assessed the joint significance of all baseline imbalances as well, focusing on the *F*-statistic for assessing baseline equivalence. Based on the results (*F*-statistic = 1.204, $p = 0.273$), I failed to reject the null hypothesis of baseline equivalence. Although there were scattered instances of modest imbalances on individual covariates, as described above, this is not unexpected. Furthermore, all final analyses controlled for all of the baseline measures displayed in Table 5.1.

**Virtual communication at baseline and correlates of communication frequency**

I first examined whether more frequent virtual communication at baseline was associated with any differences in mentoring relationship quality ratings or measures of students' attitudes. These analyses had two objectives. First, to describe the extent to which mentors and students were already using virtual methods of communication, even in the absence of informational reminders. Second, these analyses confirmed that more frequent communication was, in fact, correlated with stronger perceptions of mentoring relationships.

Figure 5.3 displays the frequencies with which students and mentors each reported sending and receiving text messages, emails, and phone calls during a typical week. As these figures show, baseline levels of virtual communication were fairly low. For example, 65 percent of mentors reported receiving zero text messages from their mentees during a typical week, and 95 percent and 97 percent reported receiving zero emails and phone calls, respectively. Mentor outreach as reported by students was somewhat higher: only 42 percent of students reported never receiving text messages from their mentors during a typical week, and 33 percent of students reported that their mentors sent two or more texts. Among both students and mentors, text messaging was the most common form of communication, and very few respondents reported ever making or receiving phone calls (94 percent of mentors and 93 percent of students self-reported never placing any calls).

As Figure 5.3 shows, students and mentors both self-reported reaching out more often than their counterparts reported receiving communication. For instance, 59 percent of students reported never sending texts compared to 65 percent of mentors who reported never receiving texts. Mentor outreach followed a similar trend: only 31 percent of mentors reported never texting, whereas 42 percent of students reported never receiving texts. Given the possibility that social desirability bias influenced how individuals' self-reported communication frequency, the main impact analyses concentrated on outreach received (i.e., students' reports of messages received from mentors and vice versa).

Table 5.2 presents the results of descriptive analyses of the factors correlated with more frequent virtual outreach prior to the intervention. Higher quality mentoring relationships were associated with more frequent virtual communication. For example, for each one point increase in students' ratings of their relationship with mentors (scale ranged from 1-4), they also reported receiving an average of one additional touchpoint every other week (including texts, emails, or phone calls). I observed a similar trend for mentors. For each one point increase in mentors' ratings

of relationship quality (scale ranged from 1-6), mentors reported receiving about one additional check-in from students every three to four weeks.

Other factors were less predictive of communication frequency. On the whole, students' baseline attitudinal measures were not associated with either higher or lower levels of outreach. Most of sociodemographic background characteristics were unrelated to outreach with the exceptions of students' free and reduced price lunch (FRPL) status (students' receipt of FRPL was associated with higher levels of mentor outreach) and mentoring experience (students paired with more experienced mentors reported receiving slightly less communication).

Taken all together, the results of these descriptive analyses show that even though the WF organization set an expectation that mentors should reach out to students outside of in-person meetings at least once per month, many pairs reported never using virtual communication to connect prior to the intervention. Importantly, these findings also show that pairs with closer relationships tended to communicate virtually more often, suggesting that enhancing virtual outreach may be a promising approach to strengthening relationships and increasing the benefits of mentoring that youth receive. With that in mind, I turn next to the results of the intervention intended to bolster virtual communication through informational mentor reminders.

**Intervention impacts on outreach frequency and student responsiveness**

Table 5.3 presents the impact of mentor reminders on mentor outreach, student outreach, and student responsiveness in Panel A. Impact estimates are reported in effect sizes. I found that the intervention had a null effect on mentor outreach: students whose mentors received the reminders did not report receiving any more or less frequent communication (*ES* = 0.05, SE = 0.15, $p$ = 0.741). Student outreach, however, was negatively affected. Treated mentors' reports of virtual communication from students were just over one quarter of a standard deviation lower, a small to moderate effect (*ES* = -0.27, SE = 0.12, $p$ = 0.05). In practical terms, whereas comparison group mentors reported receiving about four or five touchpoints per month (an average of one per week), treated mentors reported that their students only reached out about three times per month. This result aligns with the impact of the intervention on student responsiveness, which was also negative. On a 4-point scale ranging from 1=Never to 4=Always, students' rated the frequency of their responses about one third of a standard deviation, about half a scaled-point (0.6-point), lower if their mentors received reminders (*ES* = -0.33, SE = 0.13, $p$ = 0.035). Interestingly, treated mentors' perceptions of students responsiveness were unaffected (*ES* = 0.10, SE = 0.14, $p$ = 0.499). To summarize, the main results indicated that although mentors' outreach to and perceptions of

students were unchanged, reminding mentors did appear to negatively affect students' outreach and their responsiveness to mentors' virtual communication.

Panel B of Table 5.3 presents the impact of mentor reminders on students' and mentors' perceptions of their mentoring relationships. I found that receiving informational reminders had a moderate, negative effect on mentors' perceptions of their relationships with students. Treated mentors' ratings of relational closeness were about one quarter of a standard deviation, or about 0.25-points lower, compared to an average score of 4.5 on a 1-6 scale among mentors in the comparison group (*ES* = -0.26, SE = 0.11, $p$ = 0.029). Mentors' perceptions of their relational satisfaction were also worse, about one third of a standard deviation, or about 0.4-points, lower compared to the comparison group average score of 4.4 (*ES* = -0.33, SE = 0.10, $p$ = 0.006). I also found suggestive evidence that the reminders negatively affected students' ratings of both the relational and instrumental quality of their relationships, although it was not possible to rule out a null effect (relational quality: *ES* = -0.12 , SE = 0.12, $p$ = 0.25; instrumental quality: *ES* = -0.14, SE = 0.12, $p$ = 0.224).

One possible interpretation of these findings is that the messages heightened mentors' awareness of the level of communication (or lack thereof) between themselves and students, leading to lower levels of perceived closeness and satisfaction. As the next set of results reveals, however, this hypothesis is unlikely to account for the full effects of the intervention as other student outcomes were also affected.

**Intervention impacts on student attitudes**

In addition to the negative effects on students' outreach frequency and responsiveness, I also found that students of treated mentors gained less from the WF mentoring program as a whole in terms of their attitudinal growth. Table 5.4 shows the effects of the intervention on the following student attitudes: self-efficacy, growth mindset, goal orientation, perseverance, and adult support. Although there were no effects on ratings of growth mindset and adult support, I found that the level of self-efficacy, goal orientation, and perseverance reported by students were each around one quarter of a standard deviation lower if their mentors received reminders (self-efficacy: *ES* = -0.28, SE = 0.12, $p$ = 0.017; goal orientation: *ES* = -0.2, SE = 0.11, $p$ = 0.43; perseverance: *ES* = -0.21, SE = 0.12, $p$ = 0.036). In slightly more practical terms, the impact on self-efficacy, for example, indicated that the intervention reduced students' self-ratings by about 0.2-points, compared to a comparison group average of 4.3 on a 1-5 scale. Although a fairly small effect, the impacts on

student attitudes were not negligible, especially given the low intensity of the intervention (a mere three reminder emails sent to mentors).

**Exploratory analyses: Possible causal mechanisms**

In an attempt to shed light on how reminding mentors to reach out could lead to worse ratings of mentoring relationships and student attitudes, I conducted several exploratory analyses to identify possible causal mechanisms. Since I hypothesized that changes in virtual communication (the subject of the informational reminders that the mentors received) likely explained any subsequent results, these analyses aimed to describe in more detail exactly how pairs' virtual communication was impacted.

To begin, I examined treatment effects on virtual outreach and student responsiveness via each mode of communication separately (text, email, and phone calls). Table 5.5 displays the effect of the nudges on mentor- and student-initiated outreach via text, email, and phone (Panel A), as well as the effects on students' and mentors' perceptions of the rate at which students responded to each mode of communication (Panel B). Figure 5.4 depicts several selected findings graphically.

Additionally, I explored whether the effect of the reminders might have operated along the intensive margin (any vs. no communication) or extensive margin (frequent vs. less-frequent communication). The goal of these analyses was to determine whether the main findings of overall null effects on mentors' outreach and negative impacts on students' outreach and responses might be driven by changes in either the number of pairs who ever communicated versus never communicated, or who communicated frequently (e.g., 2 or more touchpoints per week, or reported that students' "always" responded) versus less-frequently. Table 5.6 presents the results of linear probability models estimating the treatment effects along these two margins.

Looking first at Table 5.5, the results shed some light on how the nudges impacted virtual outreach. First, the negative impacts on students' outreach overall were due to their decreased use of text messaging. Compared to students in the comparison group, from whom mentors reported receiving an average of 1 text per week, treated mentors reported receiving about 0.5 fewer texts per week (*ES*=-0.34, SE=0.18, *p*=0.1). Figure 5.4 shows the number of text messages mentors reported receiving in an average week at baseline and at the time of the post-survey, illustrating the lower level of outreach among treated students.

In addition to sending fewer texts, treated students perceived themselves as less-responsive to their mentors' text messages. Comparison group students self-rated their responses to mentors' text messages with an average score of 3.2 (between 3=Sometimes and 4=Always), whereas treated

students' ratings were an average of 0.4-points lower, for an average score of about 2.8 (between 2=Rarely and 3=Sometimes). Taken together, the results related to students' outreach and response suggest that something about the reminders (which mentors received via email) led students to respond less-often to their mentors' text messages and to initiate communication via text less-often.

I also found suggestive evidence that the intervention may have enhanced pairs' communication via email. Although the exploratory results were consistent with the main finding of null effects on mentors' outreach, there was a positive, though non-significant, impact on mentors' email frequency. Students in the comparison group reported receiving an average of 0.61 emails per week, or about 2-3 per month (assuming 4.5 weeks per month). Treated students, on the other hand, reported about 0.4 more emails per week, or an average of 4-5 emails per month. The bottom panel of Figure 5.4 depicts these differences across treatment status. A possible explanation of this finding is that as mentors received the reminder, which were sent via email, the messages prompted them to immediately reach out to students (thus increasing their outreach via email). Although it was not possible to rule out a null effect on mentors' email frequency, the possibility that the nudges enhanced pairs' use of email was also supported by a significant, and positive, impact on mentors' perceptions of students' responses to emails ($ES$ = 0.33, SE = 0.13, $p$=0.005). This positive effect was especially notable because treated mentors perceived their students as less-responsive to phone calls (null effects on texts), and treated students also saw themselves as less-responsive to text message and calls. It is worth noting that although the effect on student responsiveness to emails was positive, the magnitude of the impact was still fairly small. Compared to non-nudged mentors, whose average rating of students' responses was 1.2 (somewhere between 1=Never and 2=Rarely), treated mentors gave their students' an average rating of 1.4 (only slightly closer to "Rarely" responding to emails).

To summarize, students whose mentors received reminders were less likely to initiate communication via text message, which was the primary mode of communication used by students. In addition, students of nudged mentors perceived themselves as less-responsive to mentors' communication, with significant effects on responses to texts and phone calls. Meanwhile, there was suggestive evidence that nudged mentors may have sent more emails (although the impacts were small and non-significant), and there was evidence of a small, but significant, improvement in students' responses to mentors' emails (although again, the practical significance of the effects was small). If virtual communication generally, or perhaps emails in particular, between nudged mentors and students was less effective, or if students felt their communication with mentors was less

personal or meaningful, this could explain why students reported being less responsive and less-likely to initiate communication themselves.

The estimated treatment effects along the intensive versus extensive margin, displayed in Table 5.6, provide some additional insight into how the reminders impacted communication. Encouragingly, these results do not indicate that the intervention eliminated all virtual communication. Comparing the impacts on receiving any vs. no communication with the effect on less-frequent vs. more-frequent communication, the changes in communication were larger and more often significant along the latter margin. This suggests that the reminder messages did not cut off all virtual communication between mentors and students, but rather that they may have reduced the urgency with which both parties, and students in particular, responded. In other words, treated students did not stop reaching out altogether, but merely reached out and responded less often.

**Robustness checks**

The results presented above were robust to several checks. First, given that survey non-response due to the COVID-19 pandemic altered the sample of students with outcomes data available for analysis, I explored whether any of the baseline student or mentor covariates predicted responding to the end-of-program survey (results available upon request). I found that higher levels of parental education was the only significant predictor of an increased likelihood of responding. In addition, I also examined how the baseline imbalances present in the analytic sample compared to those in the original experimental sample and the sample of students with complete mentors survey responses. Appendix Table B.2 and Appendix

Table B.3 show how the treatment and comparison groups differed in these alternate samples. Although the differences across treatment statuses were smaller within the original sample, the pattern of differences matches the analytic sample. In both cases, the treatment group reported somewhat lower levels of MRQ and communication frequency at baseline. The fact that these imbalances were present to a degree at baseline makes it less-likely that imbalances in the analytic sample were caused by differential survey non-response. All together, these checks suggest that any changes in the sample due to survey non-response were unlikely to explain the estimated treatment effects.

Next, to account for the clustered nature of the data (students nested within mentor groups), I estimated models that included a random-effect for mentors, rather than using simple OLS with clustered robust standard errors, the approach I followed in the main analyses. The results were both statistically and qualitatively very similar to those presented in Table 5.3 and Table 5.4. Appendix Table B.4 and Appendix Table B.5 display the results of this alternate specification.

In the exploratory analyses, I used linear probability models to investigate the effects of the along the margins of any outreach and ever responding (vs. no outreach and never responding) and in terms of frequent outreach and always responding (vs. less consistent outreach and responses). Given the binary nature of these outcomes, logistic regression seemed as a possibly more appropriate approach to estimating the treatment effects. Appendix Table B.6 displays the results using logistic regression, which were qualitatively similar to the main findings reported in Table 5.6.

Finally, I estimated the effect of the mentor reminders on communication frequency and mentoring relationship quality using data from two additional student surveys. The first was a mid-point survey administered in late February and early March 2020, just before schools closed due to COVID-19. WF representatives sent two mentor reminders prior to administering the mid-point survey, which was collected during an in-person WF session at which mentors were not present. Secondly, students responded to an online survey following the conclusion of the WF program (May 2020). This survey captured the effect of all five mentor reminders. Before analyzing the effects using data from these two additional surveys, I first examined whether baseline covariates were balanced across the treatment and comparison groups for the samples of students who responded to each survey and I concluded that these samples were balanced (results available upon request).

Appendix Table B.7 presents the estimated treatment effects at the time of the mid-point survey (late Feb/early Mar 2020) and final survey (late May 2020). Although there are some differences in statistical significance, likely due to changes in the underlying sample sizes, the results

are qualitatively similar to the main findings presented above which are based on data from the post-WF survey (collected in early Apr 2020). This finding lends further to support to the conclusions summarized above about the impact of the mentor reminders on virtual communication frequency and mentoring relationship quality.

## Discussion

To summarize this paper's main findings, reminding mentors to reach out to students did not increase (or decrease) mentors' use of virtual communication overall, and may have even slightly increased their outreach via email. The intervention did, however, reduce the rate at which students reached out, specifically via text message. Students whose mentors received reminders also perceived themselves as less responsive to their mentors' outreach. Taken together, this suggests that something about the informational reminders reduced students' engagement in virtual communication.

The results also showed that reminding mentors weakened students' and mentors' perceptions of the quality of their relationships. For students, the effects were small and statistically non-significant. For mentors, however, the negative effects were moderately large and significant. Given that changes in virtual communication (the subject of the reminders) were the most likely mechanism through which the intervention impacted any subsequent outcomes, the reduction in students' outreach may have been to blame. The fact that students reached out less, combined with how the reminders may have heightened mentors' attention to the communication they were (or were not) receiving, perhaps discouraged mentors and led them to feel that their relationships with students were less effective, close, and satisfying. A similar process could have occurred for students: less-frequent communication, perhaps as a result of less-satisfying virtual interactions with mentors, may have weakened students' views of their mentoring relationships as warm and productive.

Although mentors' feelings of discouragement could explain the intervention's negative effects on relationship quality, the fact that students benefited less from the mentoring program as a whole suggests that the reminders likely impacted more than just mentors' perceptions. Some aspect of the intervention also led students to rate their self-efficacy, goal-oriented motivation, and perseverance worse than their peers whose mentors did not receive the reminders.

One possible explanation is that receiving external reminders and using prescribed discussion prompts undermined the authenticity of mentors' communication. This intervention assumed that simply because there was a positive connection relating communication frequency and relational quality, manipulating the level of frequency would produce a corresponding change in

relationships. But this might not be the case, as evidence from other contexts makes clear. For example, Loewenstein, Krishnamurti, Kopsic, and McDonald (2015) set out to test the causality of another, and widely observed, positive correlation: the link between sexual frequency and happiness. Although considerable research has observed that sexual frequency is a strong positive predictor of self-reported happiness, prior studies could not determine whether increased frequency leads, causally, to an increase in well-being. To test this assumption, the authors designed an experiment in which they recruited couples who were willing to change their patterns of sexual behavior, and randomly assigned half to receive instructions to double their sexual intercourse frequency. They found that the treatment successfully induced behavioral changes, but that, unexpectedly, increased sexual frequency did not lead to an increase in happiness, and in fact, the reverse was true. Treated couples reported lower levels of mood (the daily measure of happiness), enjoyment, and desire for sex. The authors explored various possible mechanisms, and found that the treatment itself (i.e., directive instructions) was responsible for undermining couples' intrinsic motivation to have sex. Ultimately, Loewenstein and colleagues (2015) concluded that their experimental design obscured their ability to test the causal relationship between sexual frequency and happiness. They did, however, determine that prescribing relational engagement can backfire as an approach to increasing couples' connection or happiness.

Connecting the findings from Loewenstein et al. (2015) to the present study, there are some similarities, albeit in pursuit of different behavioral changes. Individuals in both situations received directive instructions to engage in a relational practice (in this case, reaching out by text, email, or phone calls). Although the frequency with which pairs engaged in these relational practices was correlated with stronger ratings of their relationship quality, both experiments revealed that simply directing pairs to increase their frequency did not improve the relationships, and in fact, the reverse occurred. Rather than fostering connections, it appeared that receiving directive instructions may have actually undermined the quality or authenticity of pairs' engagement.

This finding represents an important nuance in our understanding of how behavioral interventions operate. Although prior evidence shows that reminder nudges can support individuals' completion of discrete tasks (e.g., checking their child's grades online, or completing financial aid paperwork; Bergman & Chan, 2019; Castleman & Page, 2016), prescribing relational practices may be less effective. The current study contributes evidence that relationships may be best developed organically and that directive instructions can make relational connections feel less-authentic.

Although the current study cannot uncover exactly what happened in this setting, a possible scenario is that the discussion-starters recommended within the reminders made mentors' messages feel overly-structured or less-genuine to students. If so, this could account for the decreases in students' responses and outreach. Less-effective communication, and subsequent feelings of disconnection, could also explain the negative impacts of the reminders on relationship quality. Lower quality communication and weaker relationships might also lead students to gain less from the mentoring program as a whole.

Students' and mentors' comments during focus groups bolster the hypothesis that strong relationships may be a necessary precursor to consistent virtual communication, rather than the other way around. Asked about students' overall low response rates to mentors' outreach, one student responded: "[Students] probably don't respond right away because they don't have, [or] they might not get a bond with their mentor…[Students respond] if they connect on a personal level or have fun together." Reflecting on the challenges of remote mentoring that pairs faced during the pandemic, one mentor said, "If students don't have to participate in school, so to speak, they're certainly not going to be 'all hands on deck' when it comes to communicating with someone they didn't get to have a great relationship with all the way through, like they were supposed to."

More evidence is needed to fully understand the unexpected finding that encouraging communication actually diminished mentor-student communication, with subsequent negative impacts on mentoring relationships and student attitudes. This study does, however, make several conclusions clear. First is that virtual communication and relationship quality are correlated, although the possible causality and direction of the relationship remains uncertain. Second, it is clear that light-touch informational reminders can lead to small changes in virtual communication patterns, but that they must be carefully designed in order to yield the intended benefits for students. Lastly, unlike nudges that target discrete tasks, informational reminders may be less effective at fostering relational practices. As this study shows, educational leaders must tread carefully as they take steps to encourage virtual outreach. Particularly at present, as remote learning separates many students from supportive school personnel, it is vital to learn and thoughtfully apply best practices for providing student support virtually.

## Limitations

While this study contributed several key findings about supporting virtual communication via mentor reminders, there are several notable limitations and areas for future research. First, the outcome measures all relied on students' and mentors' self-reported perceptions of their

communication, relationships, and attitudes, which could be biased by individuals' tendencies to report socially desirable responses or by their ability to accurately recall communication during a typical week. In addition, because the outreach frequency items asked about communication during a typical week, it is possible that the measures obscured effects on communication that occurred less than weekly. For example, if a mentor pair sent only one or two text message per month, it is unclear how they would respond to items asking about outreach during a typical week.

Another important limitation was the high rate of missing outcome data for students due to the challenge of engaging study participants during the COVID-19 pandemic. Although the internal validity of the findings was not affected by differential response rates across treatment statuses, somewhat high overall survey non-response rates may raise concerns about the study's external generalizability. The small sample size may have also limited the precision with which true intervention effects could be detected. Finally, this study took place within a particular mentoring program. Thus, whether or not the findings would hold in other contexts is unknown.

Perhaps the most important limitation is that the study was not designed to explore specific mechanisms that could explain the impact of the intervention. Future research, thus, is needed to better understand how informational reminders impact mentors. In particular, future studies could test whether altering the content or format of mentor reminders leads to different results.

Finally, this study revealed that students' use of virtual communication remained quite low, regardless of whether their mentors received informational reminders to reach out. Future research might explore whether nudges directed at students, rather than mentors, for example, hold more promise for supporting virtual outreach. Other approaches to bolstering student-mentor connections and communication also warrant further exploration.

## Conclusion

Although many are looking forward to resuming in-person mentoring when it is safe to do so, some elements of virtual mentoring may remain. For adults whose roles involve student support, multiple points of contact and flexibility are likely a good thing, and to the extent that technology can help with that, virtual outreach should continue. This is why, perhaps now more than ever before, it is vitally important to identify best practices for supporting students using virtual communication. This study begins to address this gap by assessing the effectiveness of an intervention designed to enhance mentors-students virtual outreach. Not only does this study add to our collective understandings about remote student support, it also extends existing research on behavioral interventions by showing that the kind of informational reminders proven effective for

discrete tasks may operate somewhat differently when targeting relational connections. Importantly, this study shows that although a light-touch intervention, such as reminder emails, can have small effects on virtual communication, the results are not unambiguously positive. This study provides suggestive evidence that reminding mentors and prescribing discussion prompts may change the quality of their virtual outreach in ways that actually make students less responsive to their support. Further research is needed, however, to explore precisely how mentor reminders may have changed either the content or the quality of their outreach and whether, perhaps, virtual communication interventions would be more effective if directed at students.

Figure 5.1 Mentor Reminder #1, sent: Monday, Feb 3, 2020

Dear Mentor,

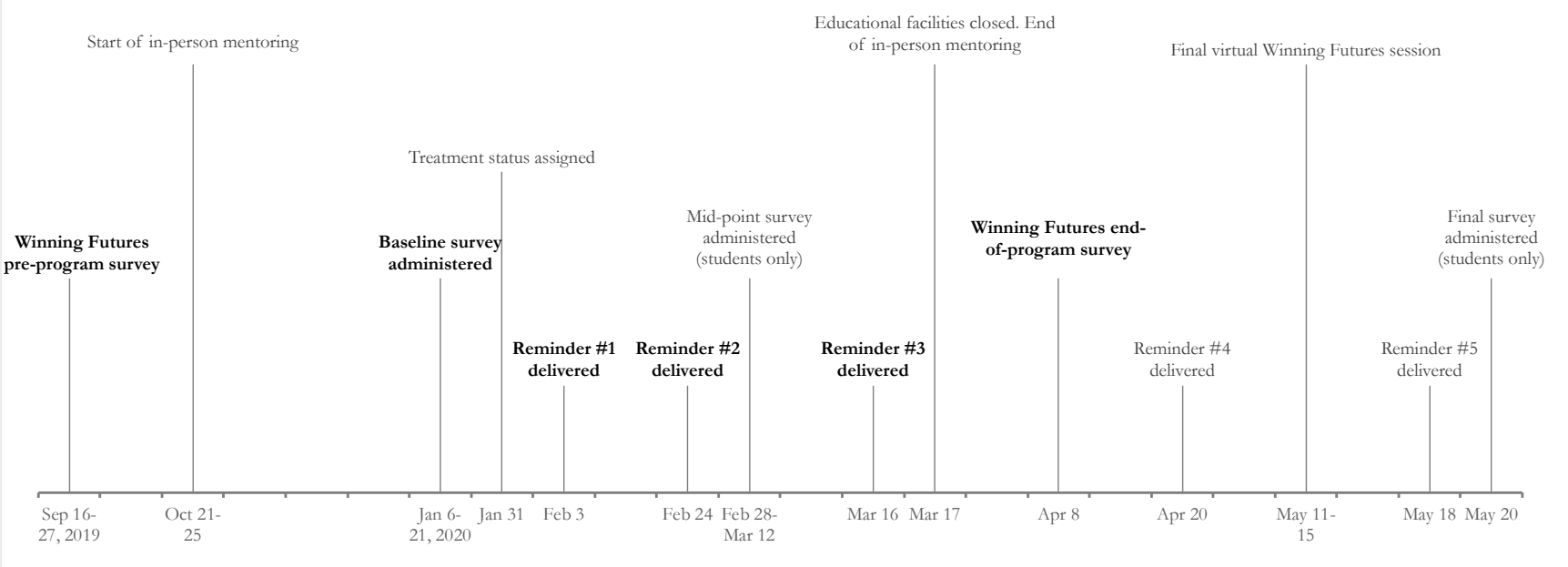
Have you been in touch with your mentees outside of class recently? With the new semester just getting started, your support can give your mentees confidence to put their best effort forward. Take a moment today to reach out by email, text, or phone, and remember to follow-up to your mentees' responses!

*Ask your mentee:*

- Light, easy questions to respond to:
    - What's new since we last saw each other?
    - Happy Monday! What are you looking forward to this week?
    - How is the start to your week going?
- Questions that show you care:
    - Are you looking forward to the new semester?
    - What are you most proud of about last semester?
    - Is there anything you want to improve at this semester? How can I support you?

*Thanks for being a mentor! Your support means so much to your mentees!*

Figure 5.2 Study timeline: data collection and intervention implementation




Notes: Bolded items indicate interventions and measures assessed in main analyses

Table 5.1 Summary statistics and treatment-comparison group balance on student and mentor baseline characteristics

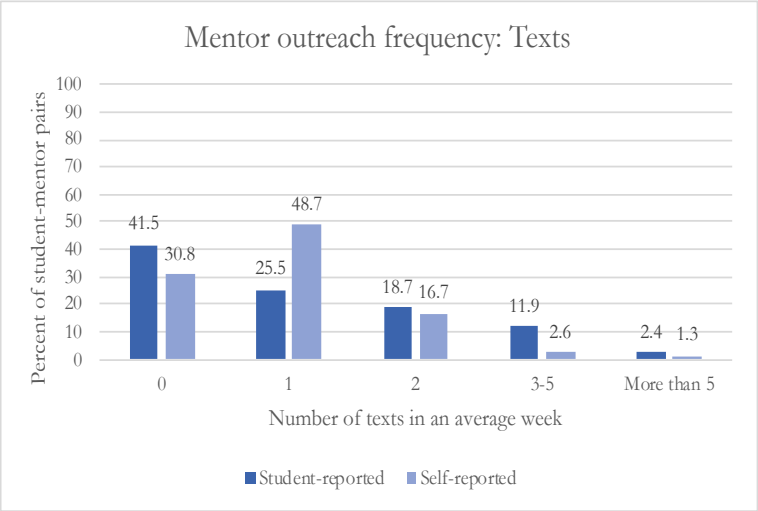
| Variable | Min | Max | Overall mean/prop. | SD | Treatment group mean/prop. | Comparison group mean/prop. | Difference | Effect size of diff. | *p*-value of diff. |
|---|---|---|---|---|---|---|---|---|---|
| ***Student characteristics*** | | | | | | | | | |
| Female | 0 | 1 | 0.51 | 0.50 | 0.48 | 0.54 | -0.06 | -0.11 | 0.454 |
| Black | 0 | 1 | 0.59 | 0.49 | 0.60 | 0.58 | 0.02 | 0.05 | 0.747 |
| White | 0 | 1 | 0.10 | 0.30 | 0.13 | 0.07 | 0.06 | 0.20 | 0.187 |
| Other race | 0 | 1 | 0.31 | 0.46 | 0.27 | 0.35 | -0.08 | -0.18 | 0.226 |
| Receives FRPL | 0 | 1 | 0.81 | 0.39 | 0.78 | 0.84 | -0.06 | -0.15 | 0.310 |
| Mother has a BA degree | 0 | 1 | 0.43 | 0.50 | 0.45 | 0.39 | 0.06 | 0.12 | 0.435 |
| Father has a BA degree | 0 | 1 | 0.30 | 0.46 | 0.29 | 0.32 | -0.03 | -0.07 | 0.677 |
| Either parent has a BA degree | 0 | 1 | 0.48 | 0.46 | 0.49 | 0.47 | 0.02 | 0.04 | 0.783 |
| ***Mentor characteristics*** | | | | | | | | | |
| Female | 0 | 1 | 0.51 | 0.50 | 0.48 | 0.53 | -0.05 | -0.11 | 0.467 |
| Black | 0 | 1 | 0.40 | 0.49 | 0.32 | 0.48 | -0.15* | -0.31 | 0.029 |
| White | 0 | 1 | 0.46 | 0.50 | 0.50 | 0.41 | 0.09 | 0.18 | 0.219 |
| Other race | 0 | 1 | 0.15 | 0.35 | 0.18 | 0.11 | 0.07 | 0.18 | 0.202 |
| Experience mentoring | 0 | 17 | 2.46 | 3.12 | 2.73 | 2.15 | 0.58 | 0.19 | 0.199 |
| ***Self-reported student attitudes*** | | | | | | | | | |
| Self-efficacy | 1 | 5 | 3.90 | 0.69 | 3.89 | 3.91 | -0.02 | -0.03 | 0.835 |
| Growth mindset | 1 | 4 | 2.05 | 0.74 | 1.95 | 2.17 | -0.22* | -0.30 | 0.040 |
| Goal orientation | 1 | 5 | 3.90 | 0.70 | 3.86 | 3.95 | -0.09 | -0.13 | 0.388 |
| Perseverance | 1 | 5 | 3.78 | 0.83 | 3.76 | 3.80 | -0.05 | -0.06 | 0.704 |
| Adult Support | 1 | 4 | 3.42 | 0.72 | 3.38 | 3.47 | -0.09 | -0.12 | 0.401 |
| ***Mentoring relationship quality*** | | | | | | | | | |
| Student: relational quality | 1 | 4 | 2.96 | 0.68 | 2.90 | 3.04 | -0.14 | -0.20 | 0.185 |
| Student: instrumental quality | 1 | 4 | 2.74 | 0.74 | 2.64 | 2.84 | -0.19~ | -0.26 | 0.080 |
| Mentor: closeness | 1 | 6 | 4.47 | 0.79 | 4.37 | 4.60 | -0.24 | -0.30 | 0.139 |
| Mentor: satisfaction | 1 | 6 | 4.09 | 1.01 | 3.99 | 4.22 | -0.23 | -0.23 | 0.267 |

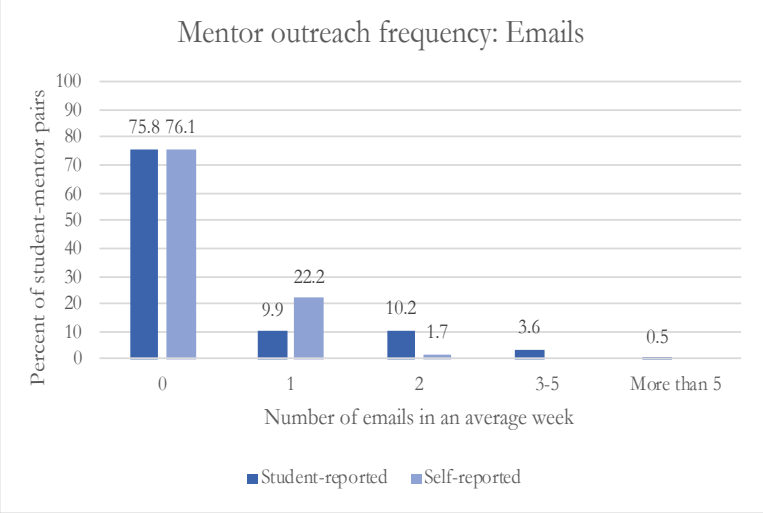
| Variable | Min | Max | Overall mean/prop. | SD | Treatment group mean/prop. | Comparison group mean/prop. | Difference | Effect size of diff. | *p*-value of diff. |
|---|---|---|---|---|---|---|---|---|---|
| ***Virtual communication frequency*** | | | | | | | | | |
| Mentor outreach frequency: student-reported† | 0 | 12 | 1.81 | 2.21 | 1.71 | 1.93 | -0.21 | -0.10 | 0.519 |
| Student outreach frequency: mentor-reported† | 0 | 4 | 0.61 | 1.00 | 0.53 | 0.74 | 0 | -0.21 | 0.294 |
| Student responsiveness: student-reported | 1 | 4 | 2.08 | 1.04 | 2.02 | 2.15 | -0.13 | -0.13 | 0.400 |
| Student responsiveness: mentor-reported | 1 | 4 | 1.56 | 0.64 | 1.51 | 1.64 | 0 | -0.21 | 0.293 |
| Student sample size | | | 192 | | 102 | 90 | *F*-test for joint significance | | 1.204 |
| Mentor sample size | | | 114 | | 59 | 55 | *p*-value of F-test | | 0.273 |

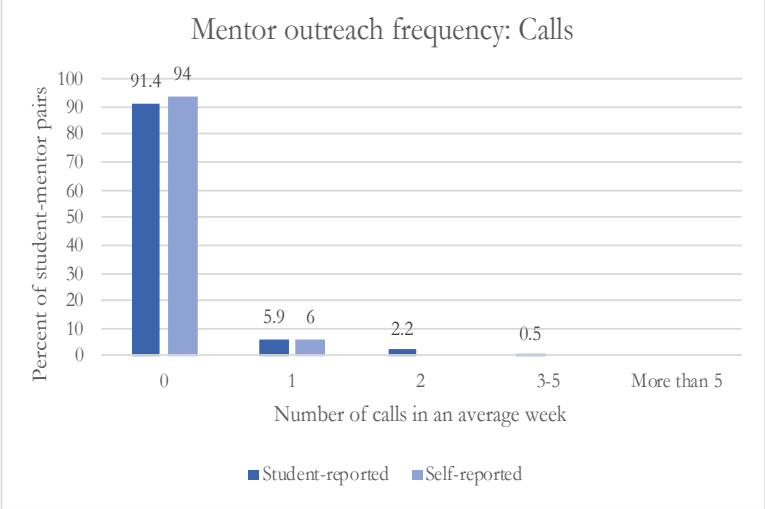
Notes: Table displays summary statistics (min, max, mean/proportion, and standard deviation) of student and mentor characteristics measured at baseline for the sample of students and mentors included in main analytic sample. Results of analyses to assess baseline balance across treatment statuses also displayed. Balance assessed in terms of each covariate individually, as well as all covariates jointly. †Outreach frequency measures sum the number of contacts via text, email, and phone received in an average week.

Figure 5.3 Frequency of mentor outreach and student outreach (by text, email, phone) at baseline

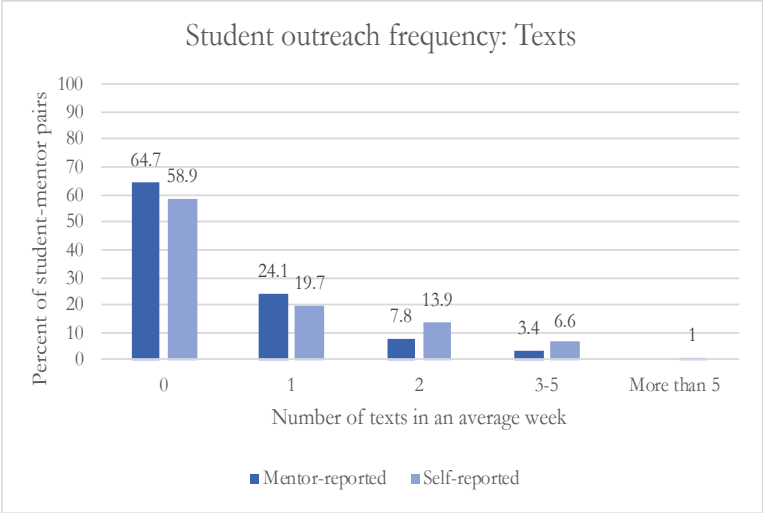
***Panel A. Mentor outreach frequency***

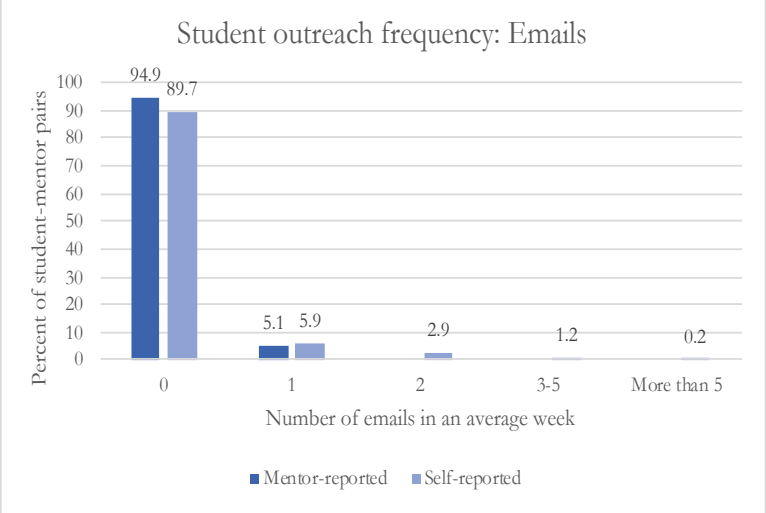


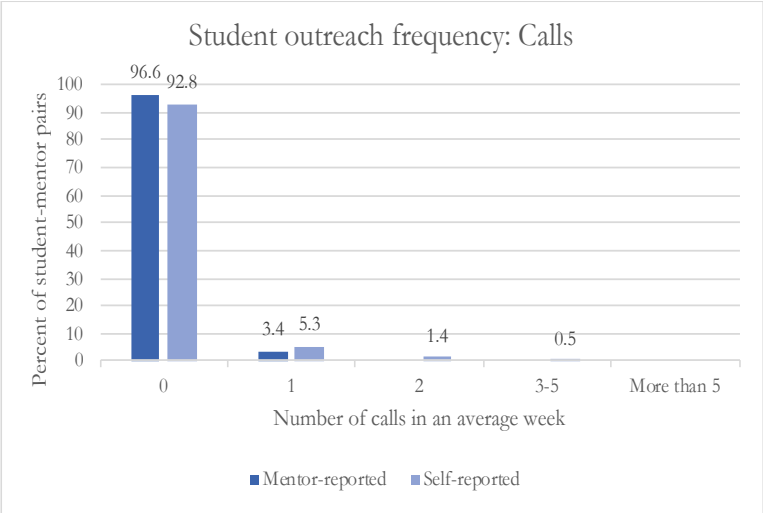



***Panel B. Student outreach frequency***




Note: Respondents reported how often in an average week they recalled sending/receiving a point of contact via each method.

Table 5.2 Predictors of more frequent virtual communication at baseline

| Dependent variable: | Mentor outreach frequency | | Student outreach frequency | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| ***Mentor characteristics*** | | | | |
| Female | 0.23 | -0.06 | 0.21 | 0.25 |
| | (0.25) | (0.25) | (0.19) | (0.22) |
| Black | 0.21 | 0.09 | 0.23 | 0.23 |
| | (0.28) | (0.27) | (0.19) | (0.19) |
| Experience mentoring | -0.10* | -0.10* | 0.06 | 0.02 |
| | (0.04) | (0.04) | (0.06) | (0.06) |
| Avg. interest in WF program | -0.14 | -0.45 | -0.13 | -0.40 |
| | (0.40) | (0.41) | (0.23) | (0.24) |
| ***Student characteristics*** | | | | |
| Receives FRPL | 0.64* | 0.56* | 0.11 | 0.05 |
| | (0.28) | (0.27) | (0.19) | (0.17) |
| Either parent has a BA degree | -0.02 | -0.02 | 0.01 | -0.05 |
| | (0.24) | (0.24) | (0.14) | (0.15) |
| ***Student attitudes*** | | | | |
| Self-efficacy | -0.13 | -0.36~ | -0.04 | -0.07 |
| | (0.15) | (0.21) | (0.06) | (0.05) |
| Growth mindset | -0.04 | -0.08 | 0.05 | 0.03 |
| | (0.13) | (0.14) | (0.06) | (0.05) |
| Goal orientation | 0.22* | 0.18 | 0.00 | -0.00 |
| | (0.11) | (0.14) | (0.07) | (0.08) |
| Perseverance | 0.15 | 0.14 | 0.04 | 0.12 |
| | (0.11) | (0.14) | (0.06) | (0.07) |
| Adult Support | 0.07 | 0.01 | -0.03 | -0.07 |
| | (0.13) | (0.12) | (0.07) | (0.07) |
| ***Mentoring relationship quality*** | | | | |
| Student: Relational quality | 0.56*** | 0.06 | 0.20** | 0.16 |
| | (0.09) | (0.23) | (0.06) | (0.13) |
| Student: Instrumental quality | 0.65*** | 0.59* | 0.17* | -0.05 |
| | (0.12) | (0.27) | (0.07) | (0.15) |
| Mentor: Relational closeness | 0.14 | 0.12 | 0.23** | -0.01 |
| | (0.15) | (0.26) | (0.08) | (0.14) |
| Mentor: Relational satisfaction | 0.13 | -0.11 | 0.32*** | 0.31~ |
| | (0.18) | (0.31) | (0.09) | (0.18) |
| Constant | Varies | 3.27** | Varies | 1.07~ |
| | | (1.25) | | (0.56) |
| Classroom FE | x | x | x | x |
| SE clustered within mentors | x | x | x | x |
| Observations | Varies | 415 | Varies | 234 |
| R-squared | Varies | 0.20 | Varies | 0.29 |

Notes: Table displays results of OLS regressions predicting mentor outreach frequency and student outreach frequency as a function of baseline covariates. Results in columns (1) and (3) show the estimated correlation between each predictor and the outcome by itself, and columns (2) and (4) shows correlations when all predictors are included in the model together. Outreach frequency measures summarize the number of texts, emails, and calls received during an average week. Analyses used non-imputed versions of outcomes variables in their original, non-standardized units. Robust standard errors, clustered within mentor groups are displayed in parentheses. *** p<0.001, ** p<0.01, * p<0.05, ~ p<0.1

Table 5.3 Effects of mentor reminders on outreach frequency, student responsiveness, and mentoring relationship quality

***Panel A: Virtual outreach frequency and student responsiveness***

| | Student-reported | | Mentor-reported | |
|---|---|---|---|---|
| Dependent variable: | Mentor outreach frequency | Student responsiveness | Student outreach frequency | Student responsiveness |
| Treatment effect | 0.05 | -0.33* | -0.27* | 0.10 |
| | (0.15) | (0.13) | (0.12) | (0.14) |
| Comparison group. mean | 3.00 | 2.65 | 1.05 | 1.73 |
| Comparison group SD | 2.78 | 1.09 | 1.30 | 0.66 |
| Observations | 192 | 192 | 365 | 365 |
| R-squared | 0.30 | 0.37 | 0.30 | 0.35 |

***Panel B: Mentoring relationship quality***

| | Student-reported | | Mentor-reported | |
|---|---|---|---|---|
| Dependent variable: | Relational quality | Instrumental quality | Relational closeness | Relational satisfaction |
| Treatment effect | -0.12 | -0.14 | -0.26* | -0.33** |
| | (0.12) | (0.12) | (0.11) | (0.10) |
| Comparison group mean | 3.06 | 2.96 | 4.46 | 4.41 |
| Comparison group SD | 0.74 | 0.80 | 0.83 | 1.15 |
| Observations | 192 | 192 | 365 | 365 |
| R-squared | 0.54 | 0.57 | 0.44 | 0.51 |

Notes: Table displays results of OLS regressions estimating treatment effects on virtual outreach frequency, student responsiveness to mentor outreach, and mentoring relationship quality. Outreach frequency measures summarize the number of texts, emails, and calls received during an average week. Student responsiveness gauges how students respond when their mentor reached out via text, email, and phone call (separate items, 1=Never to 4=Always; averaged across communication methods to create a single composite variable). Estimated impacts are reported in effect sizes: outcomes are standardized to the comparison group mean and SD. Robust SE clustered within mentor groups are displayed in parentheses. Comparison group mean and SD in original (unstandardized) units are displayed. Control variables included: classroom fixed-effects, mentor characteristics, student characteristics, baseline measures of student attitudes, mentoring relationship quality, virtual outreach, and student responsiveness. For observations where baseline values were missing, the overall item mean was imputed. *p*-values computed using randomization inference ("ritest" package in Stata). *** p<0.001, ** p<0.01, * p<0.05, ~ p<0.1

Table 5.4 Effect of mentor reminders on students' self-reported attitudes

| Dependent variable: | Self-efficacy | Growth mindset | Goal orientation | Perseverance | Adult support |
|---|---|---|---|---|---|
| Treatment effect | -0.28* | -0.03 | -0.2* | -0.21* | 0.00 |
| | (0.12) | (0.12) | (0.11) | (0.12) | (0.14) |
| Comparison group mean | 4.27 | 2.17 | 4.07 | 3.97 | 3.49 |
| Comparison group SD | 0.60 | 0.83 | 0.68 | 0.78 | 0.62 |
| Observations | 192 | 192 | 192 | 192 | 192 |
| R-squared | 0.43 | 0.50 | 0.51 | 0.43 | 0.36 |

Notes: Table displays results of OLS regressions estimating treatment effects on students' self-reported attitudes. Estimated impacts are reported in effect sizes: outcomes are standardized to the comparison group mean and SD. Robust SE clustered within mentor groups are displayed in parentheses. Comparison group mean and SD in original (unstandardized) units are displayed. Control variables included: classroom fixed-effects, mentor characteristics, student characteristics, baseline measures of student attitudes, mentoring relationship quality, virtual outreach, and student responsiveness. For observations where baseline values were missing, the overall item mean was imputed. *p*-values computed using randomization inference ("ritest" package in Stata). *** p<0.001, ** p<0.01, * p<0.05, ~ p<0.1

Table 5.5 Effects of mentor reminders on outreach by and student responsiveness to texts, emails, and phone calls

***Panel A: Outreach frequency***

| | Student-reported | | | Mentor-reported | | |
|---|---|---|---|---|---|---|
| Dependent variable: | Mentor outreach frequency: Texts | Mentor outreach frequency: Emails | Mentor outreach frequency: Calls | Student outreach frequency: Texts | Student outreach frequency: Emails | Student outreach frequency: Calls |
| Treatment effect | 0.102 | 0.349 | -0.13 | -0.34~ | 0.055 | -0.04 |
| | (0.24) | (0.23) | (0.15) | (0.18) | (0.05) | (0.04) |
| | [1.86, 1.60] | [0.61, 1.15] | [0.52, 1.00] | [0.93, 1.17] | [0.06, 0.29] | [0.05, 0.34] |

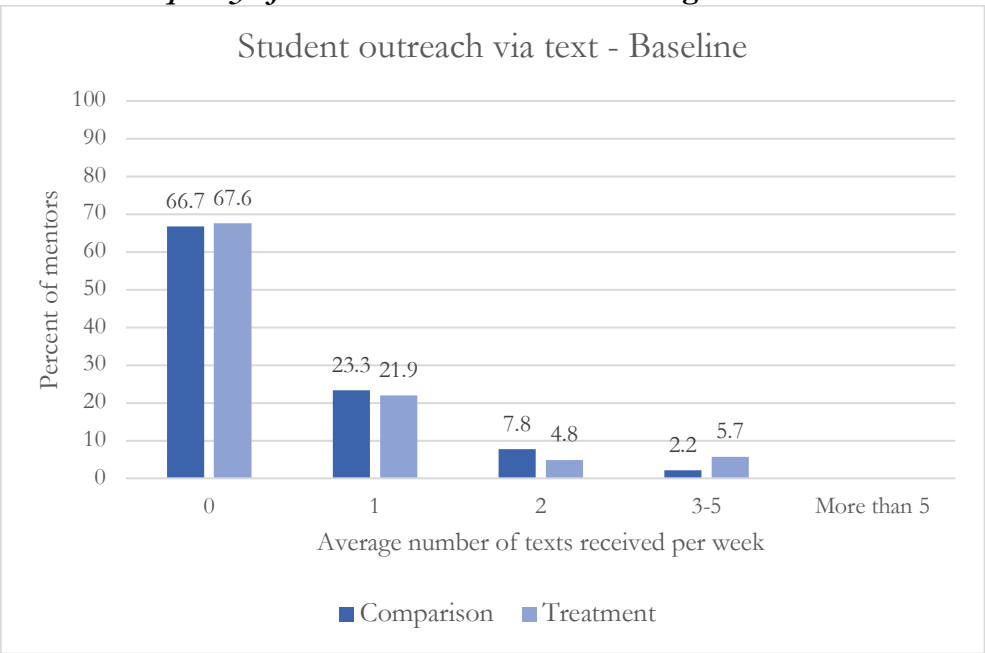
***Panel B: Student responsiveness***

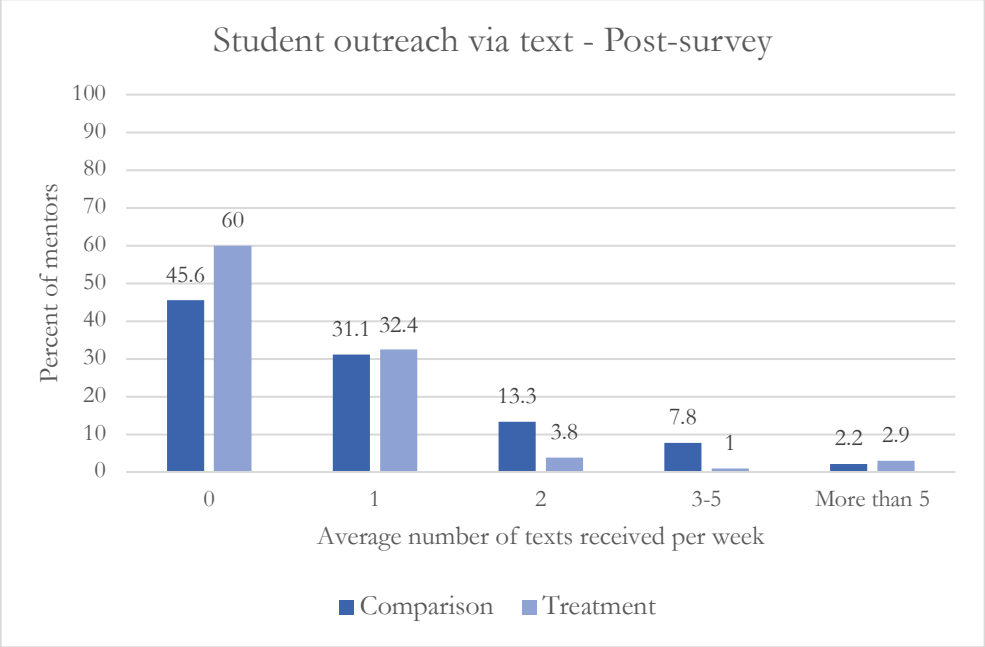
| | Student-reported | | | Mentor-reported | | |
|---|---|---|---|---|---|---|
| Dependent variable: | Student responsiveness to texts | Student responsiveness to emails | Student responsiveness to calls | Student responsiveness to texts | Student responsiveness to emails | Student responsiveness to calls |
| Treatment effect | -0.38* | -0.35 | -0.43* | -0.02 | 0.329** | -0.31~ |
| | (0.16) | (0.21) | (0.22) | (0.22) | (0.13) | (0.15) |
| | [3.24, 1.12] | [2.25, 1.31] | [2.44, 1.38] | [2.57, 1.12] | [1.21, 0.58] | [1.31, 0.77] |

Notes: Table displays results of OLS regressions estimating treatment effects on outreach frequency (Panel A) and student responsiveness (Panel B) with results for text messaging, emails, and phone calls displayed separately. Each coefficient displayed is the estimated effect from a separate regression. Outreach variables measured the frequency of texts, emails, or calls (separate items) received during an average week. Student responsiveness gauges how often students responded when their mentor reached out via text, email, or phone call (separate items, original scale: 1=Never to 4=Always). Estimated impacts are reported in effect sizes: outcomes are standardized to the comparison group mean and SD. Robust SE clustered within mentor groups are displayed in parentheses. Comparison group means and SD in original units are displayed in square brackets. Control variables included: classroom fixed-effects, mentor characteristics, student characteristics, baseline measures of student attitudes, mentoring relationship quality, virtual outreach, and student responsiveness. For observations where baseline values were missing, the overall item mean was imputed. *p*-values computed using randomization inference ("ritest" package in Stata). *** p<0.001, ** p<0.01, * p<0.05, ~ p<0.1

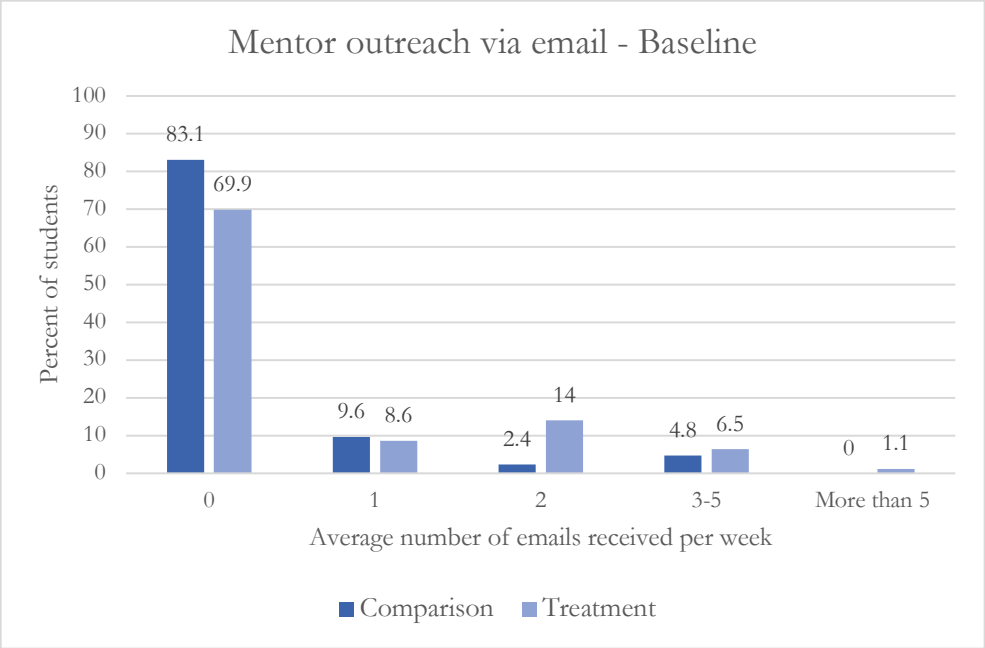
Figure 5.4 Frequency of student outreach via text (top) and mentor outreach via email (bottom) at baseline and post-survey.

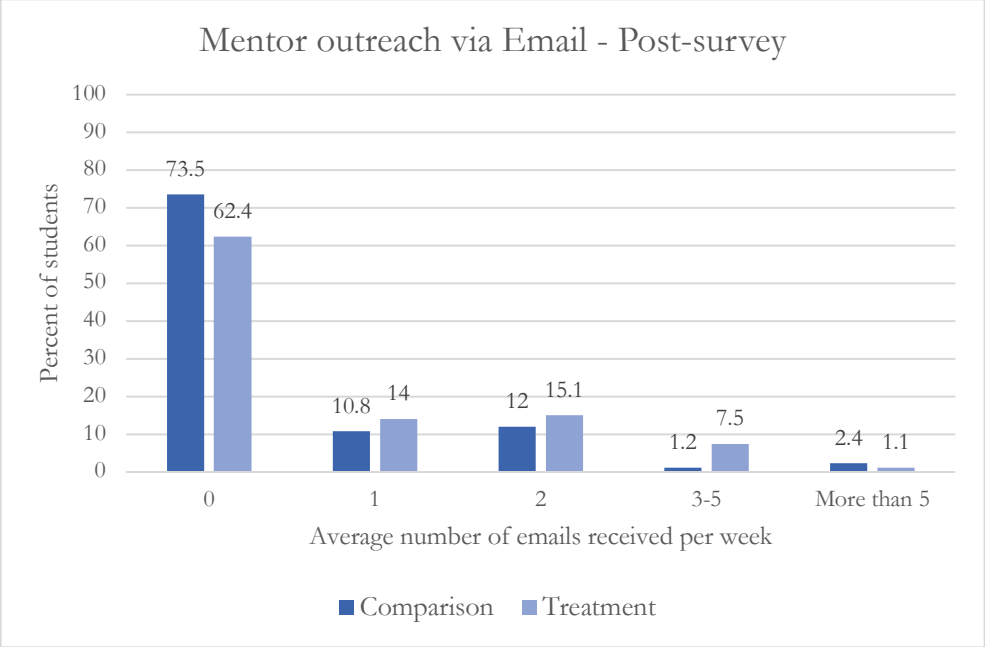
***Panel A. Frequency of student outreach via text message***



***Panel B. Frequency of mentor outreach via email***




Note: Respondents reported how often, in an average week, they received a point of contact.

Table 5.6 Effects of mentor reminders on outreach frequency and student responsiveness along intensive and extensive margins

| Dependent variable: | Student Reported | | Mentor Reported | |
|---|---|---|---|---|
| | Mentor outreach frequency | Student responsiveness | Student outreach frequency | Student responsiveness |
| Outcome = Any outreach, ever responded (vs. No outreach, never responded) | -0.03<br>(0.07)<br>[0.8, 0.40] | 0.036<br>(0.05)<br>[0.84, 0.36] | -0.11<br>(0.07)<br>[0.57, 0.49] | 0<br>(0.05)<br>[0.77, 0.41] |
| Outcome = Received 2+ touchpoints, always responded (vs. Received <2 touchpoints, did not always respond) | 0.071<br>(0.08)<br>[0.61, 0.49] | -0.2**<br>(0.06)<br>[0.36, 0.48] | -0.12*<br>(0.05)<br>[0.25, 0.43] | 0.024<br>(0.02)<br>[0.03, 0.18] |

Notes: Table displays results of linear probability models using OLS regressions to estimate treatment effects on virtual outreach frequency and student responsiveness to mentor outreach. Outreach measures indicate the frequency of texts, emails, and calls received during an average week. Student responsiveness gauges how students respond when their mentor reached out via text, email, and phone call. Binary outcomes were estimated along two margins: Any outreach/response (=1) vs. none (=0) (top row), and Frequent/Consistent outreach and response (=1) vs. less-frequent/less-consistent (=0) (bottom row). Estimated impacts represent percentage point changes in the outcomes. Robust SE clustered within mentor groups are displayed in parentheses. Comparison group means and SD in original units are displayed in square brackets. Control variables included: classroom fixed-effects, mentor characteristics, student characteristics, baseline measures of student attitudes, mentoring relationship quality, virtual outreach, and student responsiveness. For observations where baseline values were missing, the overall item mean was imputed. *p*-values computed using randomization inference ("ritest" package in Stata).
*** p<0.001, ** p<0.01, * p<0.05, ~ p<0.1

# APPENDICES

# APPENDIX A

**Appendix to Can career mentoring increase the pool of college-ready marginalized students? An experimental evaluation of the Winning Futures career mentoring program**

Table A.1 Summary statistics and treatment-comparison group balance on baseline characteristics for original sample

| Variable | Min | Max | Overall mean/prop. | SD | Treatment group mean/prop. | Comparison group mean/prop. | Difference | Effect size of diff. | *p*-value of diff. |
|---|---|---|---|---|---|---|---|---|---|
| ***Student characteristics*** | | | | | | | | | |
| Female | 0 | 1 | 0.46 | 0.46 | 0.45 | 0.48 | -0.03 | -0.06 | 0.45 |
| Black | 0 | 1 | 0.61 | 0.45 | 0.62 | 0.58 | 0.03 | 0.08 | 0.33 |
| White | 0 | 1 | 0.12 | 0.30 | 0.11 | 0.16 | -0.05 | -0.17 | 0.04 |
| Other race | 0 | 1 | 0.27 | 0.41 | 0.28 | 0.26 | 0.01 | 0.04 | 0.65 |
| Receives FRPL | 0 | 1 | 0.79 | 0.38 | 0.80 | 0.77 | 0.03 | 0.07 | 0.39 |
| Either parent has a BA degree | 0 | 1 | 0.43 | 0.43 | 0.43 | 0.40 | 0.03 | 0.07 | 0.39 |
| ***Self-reported student attitudes*** | | | | | | | | | |
| Self-efficacy | 1 | 5 | 3.84 | 0.71 | 3.86 | 3.80 | 0.08 | 0.09 | 0.33 |
| Growth mindset | 1 | 4 | 2.14 | 0.74 | 2.14 | 2.12 | 0.03 | 0.03 | 0.76 |
| Goal orientation | 1 | 5 | 3.82 | 0.76 | 3.82 | 3.83 | -0.01 | -0.02 | 0.81 |
| Perseverance | 1 | 5 | 3.66 | 0.83 | 3.67 | 3.61 | 0.07 | 0.07 | 0.43 |
| Adult support | 1 | 4 | 3.44 | 0.73 | 3.41 | 3.51 | -0.11 | -0.14 | 0.29 |
| Sample size | | | 710 | | 493 | 217 | | | |
| *F*-test for joint significance | 0.83 | | *p*-value of *F*-test | 0.61 | | | | | |

Notes: Table displays summary statistics (min, max, mean/proportion, and standard deviation) of student characteristics and pre-survey measures assessed at baseline for Winning Futures participants and comparison group students. Results of analyses to assess baseline balance across treatment statuses also displayed. Balance assessed in terms of each covariate individually, as well as all covariates jointly.

Table A.2 Student characteristics that associated with post-survey non-response

| Dependent variable: | Post-survey response recorded | |
|---|---|---|
| | (1) | (2) |
| ***Student characteristics*** | | |
| Female (vs. Male) | 0.09* | 0.10* |
| | (0.04) | (0.04) |
| White (vs. Black) | 0.02 | 0.05 |
| | (0.07) | (0.06) |
| Other race (vs. Black) | 0.02 | 0.03 |
| | (0.06) | (0.06) |
| Receives FRPL (Yes = 1) | 0.02 | 0.03 |
| | (0.06) | (0.06) |
| Parent(s) have a BA degree | 0.08* | 0.10* |
| | (0.04) | (0.04) |
| ***School fixed-effects (entered together, reference = School 7)*** | | |
| School 1 | 0.28* | 0.26~ |
| | (0.12) | (0.13) |
| School 2 | -0.05 | -0.08 |
| | (0.15) | (0.15) |
| School 3 | -0.09 | -0.12 |
| | (0.09) | (0.10) |
| School 4 | -0.08 | -0.10 |
| | (0.08) | (0.10) |
| School 5 | 0.06 | 0.07 |
| | (0.08) | (0.08) |
| School 6 | 0.12 | 0.13 |
| | (0.08) | (0.09) |
| Constant | Varies | 0.34*** |
| | Varies | (0.08) |
| Observations | Varies | 709 |
| R-squared | Varies | 0.07 |

Notes: Table reports the results of OLS regressions with SE clustered within classrooms (displayed in parentheses) predicting whether or not students responded to the post-program (1=responded; 0=no response). Column (1) shows the coefficient from a regression in which each covariate was entered individually (the school fixed effects were entered jointly, with School 7 as the reference group). Column (2) shows the coefficients from a regression in which all the predictors were entered together. *** p<0.001, ** p<0.01, * p<0.05, ~ p<0.1

Table A.3 Measures of college-ready attitudes

| Outcome, description | Measure, sample items, and internal consistency (for validated survey measures) | Date collected |
|---|---|---|
| Self-efficacy: Youths' sense of confidence in and progress towards personal goals | Sample items: For each sentence, decide how much you disagree or agree with it: "I will be able to achieve most of the goals that I have set for myself," and "When facing difficult tasks, I am certain that I will accomplish them." (Scale: Strongly disagree, Disagree, Neutral, Agree, Strongly agree)<br>Source: New General Self-Efficacy Scale (Chen et al., 2001).<br>Int. consistency:<br>*Current study* – 7 items measured self-efficacy: Baseline survey α=0.91; Post-survey α=0.9<br>*Published* – In two samples of U.S. undergraduate students, alpha levels ranged from α = .86 to .90 | Sep-19, Apr-20 |
| Growth mindset: Extent to which youth see intelligence as malleable. | Sample items: Mark the choice that shows how much you agree with it: "You can learn new things, but you can't really change your basic intelligence," and "You have a certain amount of intelligence and you really can't do much to change it." (Scale: Strongly disagree, Disagree, Agree, Strongly agree)<br>Source: Revised Implicit Theories of Intelligence (Self-Theory) Scale (De Castella & Byrne, 2015).<br>Int. consistency:<br>*Current study* – 3 items measured growth mindset: Baseline survey α=0.82; Post-survey α=0.87<br>*Published* – Sample of *N*=680 Australian young people (grades 10-12) alpha level for the Entity Beliefs Subscale was α=.87. | Sep-19, Apr-20 |
| Goal orientation: Frequency and approach to planning for goals. | Sample items: Indicate how much these statements describe you: "I have goals in my life," and "If I set goals, I take action to reach them." (Scale: Not at all like me … Exactly like me)<br>Source: Flourishing Children Project, goal orientation subscale (Lippman et al., 2014).<br>Int. consistency:<br>*Current study* – 7 items measured goal orientation: Baseline survey α=0.85; Post-survey α=0.85<br>*Published* – Sample of *N*=680 Australian young people (grades 10-12) alpha level for the Entity Beliefs Subscale was α=.87.<br>Diverse sample of U.S. youth, alpha for two goal orientation sub-scales was α=0.88. | Sep-19, Apr-20 |
| Perseverance: Youths' belief that they can complete school-related tasks. | Sample items: Indicate how much each statement describes you: "I finish whatever I begin," and "I keep at my school work until I am done with it." (Scale: Almost never, Sometimes, Often, Very often, Almost always)<br>Source: EPOCH measure of adolescent well-being-perseverance scale (M. L. Kern et al., 2016).<br>Int. consistency:<br>*Current study* – 4 items measured perseverance: Baseline survey α=0.8; Post-survey α=0.79<br>*Published* – Sample of *N*=680 Australian young people (grades 10-12) alpha level for the Entity Beliefs Subscale was α=.87.Across multiple samples of U.S. youth alpha levels ranged from α=0.72 to 0.85 | Sep-19, Apr-20 |
| Adult support<br>Level of support from caring adults outside of school | Sample items: How true are these statements for an adult outside of your family or school: "There is an adult who always wants you to do your best," and "There is an adult who believes that you will be a success" (Scale: Not at all true … Very much true)<br>Source: California Healthy Kids Survey: Resilience & Youth Development Module (WestEd, 2008)<br>Int. consistency:<br>*Current study* – 6 items measured adult support: Baseline survey α=0.89; Post-survey α=0.87<br>No published studies available | Sep-19, Apr-20 |

# APPENDIX B

## Appendix to Can Nudging Mentors Weaken Student Support? Experimental Evidence From a Virtual Communication Intervention

Table B.1 Measures of virtual communication, mentoring relationship quality, and student attitudes

| Outcome, description | Measure, sample items, and internal consistency (for validated survey measures) | Date collected |
|---|---|---|
| ***Virtual communication*** | | |
| Mentor/student outreach: Average number of times communicated via text, email, and phone | Items: "In an average week, how many times do you: Receive a text sent by your mentor (mentee)? Receive an email sent by your mentor (mentee)? Send a text to your mentor (mentee)? Send an email to your mentor (mentee)?" (Scale: 0, 1, 2, 3-5, More than 5) | Mentors: Jan-20, Apr-20<br>Students: Jan-20, Feb-20, Apr-20, May-20 |
| Student responsiveness: Frequency with which mentors/students perceive students' response to mentors' outreach | Items: Student version: "When your mentor sends a text/sends an email/gives a call, how often do you respond?" (4-point scale: Never … Always)<br>Mentor version: "When you send a text/send an email/give a call, how often does your mentee respond?" (4-point scale: Never … Always) | Mentors: Jan-20, Apr-20<br>Students: Jan-20, Feb-20, Apr-20, May-20 |
| ***Mentoring relationship quality*** | | |
| Relational quality (students' perceptions): Student feels happy, close, satisfied with relationship (relational); How much the student is open to support and perceives benefit from it (instrumental) | Sample items: Relational quality - "My mentor really cares about me … My mentor knows what is going on in my life." Instrumental quality - "I am doing better at school because of my mentor's help … My mentor listens to me better than other adults do." (Scale: 1=Not at all true … 4=Very true)<br>Source: Youth Mentoring Survey (Harris & Nakkula, 2018b)<br>Int. consistency:<br>*Current study* – Relational quality (14 items): Baseline survey α=0.92; Post-survey α=0.93; Instrumental quality (8 items): Baseline survey α=0.88; Post-survey α=0.92.<br>*Published* – In a sample of U.S. youth of all grade-levels, alpha for relational quality scale was α=0.84, alpha for instrumental quality scale was α=0.76. | Jan-20, Feb-20, Apr-20, May-20 |
| Relational quality (mentors' perceptions): Mentor feels close with student (closeness); Mentor's sense of fulfillment in the relationship (satisfaction) | Sample items: Closeness - "I feel like my mentee and I have a strong bond (are close or deeply connected) … I can trust what my mentee tells me." Satisfaction - "I feel like the mentoring relationship is getting stronger … I feel unsure that my mentee is getting enough out of our mentoring relationship." (Scale: 1=Never… 6=Often)<br>Source: Match Characteristics Questionnaire (Harris & Nakkula, 2018a)<br>Int. consistency:<br>*Current study* – Relational closeness (4 items): Baseline survey α=0.85; Post-survey α=0.82; Relational satisfaction (5 items): Baseline survey α=0.88; Post-survey α=0.92.<br>*Published* – Samples of mentors of youth across large mentoring organizations in the U.S., alpha for closeness scale was α=0.82, alpha for satisfaction scale was α=0.85. | Jan-20, Apr-20 |

| Outcome, description | Measure, sample items, and internal consistency (for validated survey measures) | Date collected |
|---|---|---|
| ***Student attitudes*** | | |
| Self-efficacy: Youths' sense of confidence in and progress towards personal goals | Sample items: For each sentence, decide how much you disagree or agree with it: "I will be able to achieve most of the goals that I have set for myself," and "When facing difficult tasks, I am certain that I will accomplish them." (Scale: Strongly disagree, Disagree, Neutral, Agree, Strongly agree)<br>Source: New General Self-Efficacy Scale (Chen et al., 2001).<br>Int. consistency:<br>*Current study* – 7 items measured self-efficacy: Baseline survey α=0.91; Post-survey α=0.9<br>*Published* – In two samples of U.S. undergraduate students, alpha levels ranged from α = .86 to .90 | Sep-19, Apr-20 |
| Growth mindset: Extent to which youth see intelligence as malleable. | Sample items: Mark the choice that shows how much you agree with it: "You can learn new things, but you can't really change your basic intelligence," and "You have a certain amount of intelligence and you really can't do much to change it." (Scale: Strongly disagree, Disagree, Agree, Strongly agree)<br>Source: Revised Implicit Theories of Intelligence (Self-Theory) Scale (De Castella & Byrne, 2015).<br>Int. consistency:<br>*Current study* – 3 items measured growth mindset: Baseline survey α=0.82; Post-survey α=0.88<br>*Published* – Sample of *N*=680 Australian young people (grades 10-12) alpha level for the Entity Beliefs Subscale was α=.87. | Sep-19, Apr-20 |
| Goal orientation: Frequency and approach to planning for goals. | Sample items: Indicate how much these statements describe you: "I have goals in my life," and "If I set goals, I take action to reach them." (Scale: Not at all like me … Exactly like me)<br>Source: Flourishing Children Project, goal orientation subscale (Lippman et al., 2014).<br>Int. consistency:<br>*Current study* – 7 items measured goal orientation: Baseline survey α=0.86; Post-survey α=0.85<br>*Published* – Sample of *N*=680 Australian young people (grades 10-12) alpha level for the Entity Beliefs Subscale was α=.87.<br>Diverse sample of U.S. youth, alpha for two goal orientation sub-scales was α=0.88. | Sep-19, Apr-20 |
| Perseverance: Youths' belief that they can complete school-related tasks. | Sample items: Indicate how much each statement describes you: "I finish whatever I begin," and "I keep at my school work until I am done with it." (Scale: Almost never, Sometimes, Often, Very often, Almost always)<br>Source: EPOCH measure of adolescent well-being-perseverance scale (M. L. Kern et al., 2016).<br>Int. consistency:<br>*Current study* – 4 items measured perseverance: Baseline survey α=0.81; Post-survey α=0.79<br>*Published* – Sample of *N*=680 Australian young people (grades 10-12) alpha level for the Entity Beliefs Subscale was α=.87.Across multiple samples of U.S. youth alpha levels ranged from α=0.72 to 0.85. | Sep-19, Apr-20 |
| Adult support<br>Level of support from caring adults outside of school | Sample items: How true are these statements for an adult outside of your family or school: "There is an adult who always wants you to do your best," and "There is an adult who believes that you will be a success" (Scale: Not at all true … Very much true)<br>Source: California Healthy Kids Survey: Resilience & Youth Development Module (WestEd, 2008)<br>Int. consistency:<br>*Current study* – 6 items measured adult support: Baseline survey α=0.89; Post-survey α=0.87<br>No published studies available | Sep-19, Apr-20 |

Table B.2 Summary statistics and baseline balance assessment for students and mentors in the original experimental sample

| Variable | Min | Max | Overall mean/prop. | SD | Treatment group mean/prop. | Comparison group mean/prop. | Difference | Effect size of diff. | *p*-value of diff. |
|---|---|---|---|---|---|---|---|---|---|
| ***Student characteristics*** | | | | | | | | | |
| Female | 0 | 1 | 0.45 | 0.50 | 0.44 | 0.46 | -0.02 | -0.05 | 0.612 |
| Black | 0 | 1 | 0.62 | 0.49 | 0.65 | 0.59 | 0.06 | 0.13 | 0.161 |
| White | 0 | 1 | 0.11 | 0.31 | 0.10 | 0.12 | -0.02 | -0.06 | 0.490 |
| Other race | 0 | 1 | 0.28 | 0.45 | 0.25 | 0.30 | -0.04 | -0.10 | 0.294 |
| Receives FRPL | 0 | 1 | 0.80 | 0.39 | 0.78 | 0.82 | -0.04 | -0.10 | 0.265 |
| Mother has a BA degree | 0 | 1 | 0.39 | 0.49 | 0.42 | 0.35 | 0.07 | 0.14 | 0.162 |
| Father has a BA degree | 0 | 1 | 0.26 | 0.44 | 0.26 | 0.27 | -0.02 | -0.04 | 0.716 |
| Either parent has a BA degree | 0 | 1 | 0.44 | 0.45 | 0.45 | 0.43 | 0.02 | 0.05 | 0.604 |
| ***Mentor characteristics*** | | | | | | | | | |
| Female | 0 | 1 | 0.45 | 0.50 | 0.45 | 0.45 | 0.00 | 0.00 | 0.964 |
| Black | 0 | 1 | 0.38 | 0.49 | 0.37 | 0.39 | -0.02 | -0.03 | 0.725 |
| White | 0 | 1 | 0.48 | 0.50 | 0.48 | 0.48 | 0.01 | 0.02 | 0.843 |
| Other race | 0 | 1 | 0.12 | 0.33 | 0.13 | 0.12 | 0.01 | 0.02 | 0.810 |
| Experience mentoring | 0 | 17 | 2.32 | 2.78 | 2.49 | 2.14 | 0.34 | 0.12 | 0.173 |
| ***Student attitudes*** | | | | | | | | | |
| Self-efficacy | 1 | 5 | 3.86 | 0.70 | 3.85 | 3.87 | -0.02 | -0.03 | 0.765 |
| Growth mindset | 1 | 4 | 2.14 | 0.74 | 2.11 | 2.17 | -0.07 | -0.09 | 0.335 |
| Goal orientation | 1 | 5 | 3.82 | 0.76 | 3.82 | 3.82 | -0.01 | -0.01 | 0.936 |
| Perseverance | 1 | 5 | 3.67 | 0.84 | 3.70 | 3.65 | 0.06 | 0.07 | 0.476 |
| Adult Support | 1 | 4 | 3.43 | 0.71 | 3.42 | 3.43 | -0.01 | -0.01 | 0.890 |
| ***Mentoring relationship quality*** | | | | | | | | | |
| Student: relational quality | 1 | 4 | 2.86 | 0.68 | 2.82 | 2.91 | -0.08 | -0.12 | 0.205 |
| Student: instrumental quality | 1 | 4 | 2.66 | 0.72 | 2.62 | 2.71 | -0.10 | -0.14 | 0.165 |
| Mentor: closeness | 1 | 6 | 4.37 | 0.90 | 4.36 | 4.39 | -0.03 | -0.03 | 0.793 |
| Mentor: satisfaction | 1 | 6 | 3.97 | 1.07 | 3.93 | 4.00 | -0.07 | -0.07 | 0.615 |

| Variable | Min | Max | Overall mean/prop. | SD | Treatment group mean/prop. | Comparison group mean/prop. | Difference | Effect size of diff. | *p*-value of diff. |
|---|---|---|---|---|---|---|---|---|---|
| ***Virtual communication frequency*** | | | | | | | | | |
| Mentor outreach frequency | 0 | 12 | 1.81 | 2.14 | 1.66 | 1.97 | -0.31 | -0.15 | 0.139 |
| Student outreach frequency | 1 | 4 | 2.01 | 1.02 | 1.98 | 2.04 | -0.06 | -0.06 | 0.556 |
| Student responsiveness: student-reported | 0 | 4 | 0.62 | 0.98 | 0.56 | 0.68 | 0.00 | -0.13 | 0.339 |
| Student responsiveness: mentor-reported | 1 | 4 | 1.52 | 0.63 | 1.52 | 1.52 | 0.00 | -0.01 | 0.954 |
| Student sample size | | | 494 | | 252 | 242 | *F*-test for joint significance | | 1.205 |
| Mentor sample size | | | 143 | | 74 | 69 | *p*-value of F-test | | 0.281 |

Notes: Table displays summary statistics (min, max, mean/proportion, and standard deviation) of student and mentor characteristics measured at baseline for the sample of students and mentors included in original experimental sample. Results of analyses to assess baseline balance across treatment statuses also displayed. Balance assessed in terms of each covariate individually, as well as all covariates jointly.

Table B.3 Summary statistics and baseline balance assessment for sample of students whose mentors responded to the post-survey

| Variable | Min | Max | Overall mean/prop. | SD | Treatment group mean/prop. | Comparison group mean/prop. | Difference | Effect size of diff. | *p*-value of diff. |
|---|---|---|---|---|---|---|---|---|---|
| ***Student characteristics*** | | | | | | | | | |
| Female | 0 | 1 | 0.45 | 0.50 | 0.42 | 0.47 | -0.05 | -0.09 | 0.374 |
| Black | 0 | 1 | 0.58 | 0.49 | 0.61 | 0.53 | 0.08 | 0.16 | 0.136 |
| White | 0 | 1 | 0.12 | 0.33 | 0.11 | 0.13 | -0.02 | -0.07 | 0.533 |
| Other race | 0 | 1 | 0.30 | 0.46 | 0.27 | 0.33 | -0.06 | -0.12 | 0.247 |
| Receives FRPL | 0 | 1 | 0.79 | 0.41 | 0.77 | 0.80 | -0.02 | -0.06 | 0.583 |
| Mother has a BA degree | 0 | 1 | 0.38 | 0.49 | 0.42 | 0.33 | 0.09 | 0.19 | 0.101 |
| Father has a BA degree | 0 | 1 | 0.26 | 0.44 | 0.26 | 0.27 | -0.01 | -0.03 | 0.841 |
| Either parent has a BA degree | 0 | 1 | 0.44 | 0.45 | 0.46 | 0.41 | 0.04 | 0.10 | 0.357 |
| ***Mentor characteristics*** | | | | | | | | | |
| Female | 0 | 1 | 0.44 | 0.50 | 0.42 | 0.47 | -0.04 | -0.09 | 0.416 |
| Black | 0 | 1 | 0.34 | 0.47 | 0.29 | 0.40 | -0.11* | -0.23 | 0.031 |
| White | 0 | 1 | 0.51 | 0.50 | 0.54 | 0.48 | 0.06 | 0.13 | 0.219 |
| Other race | 0 | 1 | 0.13 | 0.34 | 0.15 | 0.10 | 0.04 | 0.13 | 0.202 |
| Experience mentoring | 0 | 17 | 2.45 | 2.94 | 2.69 | 2.18 | 0.51~ | 0.17 | 0.100 |
| ***Student attitudes*** | | | | | | | | | |
| Self-efficacy | 1 | 5 | 3.85 | 0.68 | 3.84 | 3.87 | -0.02 | -0.04 | 0.734 |
| Growth mindset | 1 | 4 | 2.15 | 0.72 | 2.14 | 2.16 | -0.02 | -0.02 | 0.828 |
| Goal orientation | 1 | 5 | 3.81 | 0.76 | 3.79 | 3.83 | -0.04 | -0.06 | 0.589 |
| Perseverance | 1 | 5 | 3.66 | 0.82 | 3.67 | 3.65 | 0.02 | 0.02 | 0.824 |
| Adult Support | 1 | 4 | 3.42 | 0.71 | 3.39 | 3.46 | -0.07 | -0.10 | 0.341 |
| ***Mentoring relationship quality*** | | | | | | | | | |
| Student: relational quality | 1 | 4 | 2.84 | 0.66 | 2.78 | 2.92 | -0.14~ | -0.21 | 0.053 |
| Student: instrumental quality | 1 | 4 | 2.64 | 0.71 | 2.58 | 2.71 | -0.12 | -0.17 | 0.118 |
| Mentor: closeness | 1 | 6 | 4.40 | 0.93 | 4.39 | 4.41 | -0.02 | -0.02 | 0.868 |
| Mentor: satisfaction | 1 | 6 | 4.01 | 1.12 | 3.95 | 4.08 | -0.13 | -0.12 | 0.398 |

| Variable | Min | Max | Overall mean/prop. | SD | Treatment group mean/prop. | Comparison group mean/prop. | Difference | Effect size of diff. | *p*-value of diff. |
|---|---|---|---|---|---|---|---|---|---|
| ***Virtual communication frequency*** | | | | | | | | | |
| Mentor outreach frequency | 0 | 12 | 1.80 | 2.14 | 1.60 | 2.03 | -0.43~ | -0.20 | 0.071 |
| Student outreach frequency | 0 | 4 | 0.60 | 1.01 | 0.57 | 0.63 | 0 | -0.06 | 0.696 |
| Student responsiveness: student-reported | 1 | 4 | 2.04 | 1.04 | 1.97 | 2.13 | -0.16 | -0.16 | 0.160 |
| Student responsiveness: mentor-reported | 1 | 4 | 1.53 | 0.66 | 1.53 | 1.54 | 0 | 0.00 | 0.981 |
| Student sample size | | | 366 | | 194 | 172 | *F*-test for joint significance | | 1.084 |
| Mentor sample size | | | 120 | | 64 | 56 | *p*-value of F-test | | 0.386 |

Notes: Table displays summary statistics (min, max, mean/proportion, and standard deviation) of student and mentor characteristics measured at baseline for the sample of students whose mentors responded to the post-survey. Results of analyses to assess baseline balance across treatment statuses also displayed. Balance assessed in terms of each covariate individually, as well as all covariates jointly.

Table B.4 Alternative model specification estimating main treatment effects on virtual communication and mentoring relationship quality

***Panel A: Communication frequency and student responsiveness***

| | Student-reported | | Mentor-reported | |
|---|---|---|---|---|
| Dependent variable: | Mentor outreach frequency | Student responsiveness | Student outreach frequency | Student responsiveness |
| Treatment effect | 0.07 | -0.33* | -0.29* | 0.07 |
| | (0.15) | (0.15) | (0.14) | (0.15) |
| Comparison unstd. mean | 3.00 | 2.65 | 1.05 | 1.73 |
| Comparison unstd.SD | 2.78 | 1.09 | 1.30 | 0.66 |
| Observations | 192 | 192 | 365 | 365 |

***Panel B: Mentoring relationship quality***

| | Student-reported | | Mentor-reported | |
|---|---|---|---|---|
| Dependent variable: | Relational quality | Instrumental quality | Relational closeness | Relational satisfaction |
| Treatment effect | -0.13 | -0.15 | -0.26* | -0.35** |
| | (0.13) | (0.13) | (0.11) | (0.11) |
| Comparison unstd. mean | 3.06 | 2.96 | 4.46 | 4.41 |
| Comparison unstd. SD | 0.74 | 0.80 | 0.83 | 1.15 |
| Observations | 192 | 192 | 365 | 365 |

Notes: Table displays results of regressions estimating treatment effects on virtual outreach frequency, student responsiveness to mentor outreach, and mentoring relationship quality. Mentor-random effects accounted for clustering of students within mentor-groups. Additional control variables included: classroom fixed-effects, mentor characteristics, student characteristics, baseline measures of student attitudes, mentoring relationship quality, virtual outreach, and student responsiveness. For observations where baseline values were missing, overall item mean imputed. Estimated impacts reported in effect sizes (outcomes standardized to the comparison group mean and SD). Comparison group mean and SD in original (unstandardized) units displayed.
*** p<0.001, ** p<0.01, * p<0.05, ~ p<0.1

Table B.5 Alternative model specification estimating main treatment effects on students' self-reported attitudes

| Dependent variable: | Self-efficacy | Growth mindset | Goal orientation | Perseverance | Adult support |
|---|---|---|---|---|---|
| Treatment effect | -0.29* | -0.07 | -0.21~ | -0.22~ | -0.03 |
| | (0.13) | (0.15) | (0.12) | (0.12) | (0.15) |
| Comparison unstd. mean | 4.27 | 2.17 | 4.07 | 3.97 | 3.49 |
| Comparison unstd. SD | 0.60 | 0.83 | 0.68 | 0.78 | 0.62 |
| Observations | 192 | 192 | 192 | 192 | 192 |

Notes: Table displays results of regressions estimating treatment effects on students' self-reported attitudes.. Mentor-random effects accounted for clustering of students within mentor-groups. Additional control variables included: classroom fixed-effects, mentor characteristics, student characteristics, baseline measures of student attitudes, mentoring relationship quality, virtual outreach, and student responsiveness. For observations where baseline values were missing, overall item mean imputed. Estimated impacts reported in effect sizes (outcomes standardized to the comparison group mean and SD). Comparison group mean and SD in original (unstandardized) units displayed. *** p<0.001, ** p<0.01, * p<0.05, ~ p<0.1

Table B.6 Alternative models estimating treatment effects along intensive and extensive margins using logistic regression

| Dependent variable: | Student Reported | | Mentor Reported | |
|---|---|---|---|---|
| | Mentor outreach frequency | Student responsiveness | Student outreach frequency | Student responsiveness |
| Outcome = Any outreach, ever responded (vs. No outreach, never responded) | 0.64<br>(0.48)<br>[0.8, 0.40] | 0.44<br>(0.57)<br>[0.84, 0.36] | 0.53<br>(0.18)<br>[0.57, 0.49] | 1.08<br>(0.40)<br>[0.77, 0.41] |
| Outcome = Received 2+ touchpoints, always responded (vs. Received <2 touchpoints, did not always respond) | 1.42<br>(0.68)<br>[0.61, 0.49] | 0.23**<br>(0.12)<br>[0.36, 0.48] | 0.29*<br>(0.14)<br>[0.25, 0.43] | 0.00<br>(0.00)<br>[0.03, 0.18] |

Notes: Table displays results of logistic regressions estimating treatment effects on virtual outreach frequency and student responsiveness to mentor outreach. Outreach measures indicate the frequency of texts, emails, and calls received during an average week. Student responsiveness gauges how students respond when their mentor reached out via text, email, and phone call. Binary outcomes were estimated along two margins: Any outreach/response (=1) vs. none (=0) (top row), and Frequent/Consistent outreach and response (=1) vs. less-frequent/less-consistent (=0) (bottom row). Estimated impacts reported as odds ratios. SE clustered within mentor groups are displayed in parentheses. Comparison group means and SD in original units are displayed in square brackets. Control variables included: classroom fixed-effects, mentor characteristics, student characteristics, baseline measures of student attitudes, mentoring relationship quality, virtual outreach, and student responsiveness. For observations where baseline values were missing, the overall item mean was imputed. *p*-values computed using randomization inference ("ritest" package in Stata). *** p<0.001, ** p<0.01, * p<0.05, ~ p<0.1

Table B.7 Effects of mentor reminders as assessed at the experiment mid-point and conclusion

***Panel A: Virtual communication frequency and student responsiveness***

| | Student-reported on mid-point survey | | Student-reported on final survey | |
|---|---|---|---|---|
| Dependent variable: | Mentor outreach frequency | Student responsiveness | Mentor outreach frequency | Student responsiveness |
| Treatment effect | -0.12 | -0.13 | -0.04 | 0.00 |
| | (0.11) | (0.10) | (0.25) | (0.21) |
| Comparison unstd. mean | 2.64 | 2.20 | 3.84 | 2.73 |
| Comparison unstd. SD | 2.99 | 1.06 | 3.49 | 1.08 |
| Observations | 292 | 292 | 124 | 124 |
| R-squared | 0.39 | 0.44 | 0.39 | 0.29 |

***Panel B: Mentoring relationship quality***

| | Student-reported on mid-point survey | | Student-reported on final survey | |
|---|---|---|---|---|
| Dependent variable: | Relational quality | Instrumental quality | Relational quality | Instrumental quality |
| Treatment effect | -0.05 | -0.14 | -0.10 | -0.01 |
| | (0.09) | (0.08) | (0.18) | (0.16) |
| Comparison unstd. mean | 3.01 | 2.93 | 3.22 | 3.13 |
| Comparison unstd. SD | 0.72 | 0.75 | 0.61 | 0.68 |
| Observations | 292 | 292 | 124 | 124 |
| R-squared | 0.63 | 0.60 | 0.44 | 0.50 |

Notes: Table displays results of OLS regressions estimating treatment effects on virtual outreach frequency, student responsiveness to mentor outreach, and mentoring relationship quality as assessed by student responses to the mid-point and final surveys. Robust SE clustered within mentor groups displayed in parentheses. Control variables included: classroom fixed-effects, mentor characteristics, student characteristics, baseline measures of student attitudes, mentoring relationship quality, virtual outreach, and student responsiveness. For observations where baseline values were missing, overall item mean imputed. Estimated impacts reported in effect sizes (outcomes standardized to the comparison group mean and SD). Comparison group mean and SD in original (unstandardized) units displayed. *p*-values computed using randomization inference ("ritest" package in Stata). *** p<0.001, ** p<0.01, * p<0.05, ~ p<0.1

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